BUREAU OF HYGIENE AND TROPICAL DISEASES.

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## YELLOW FEVER.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1928. June. Vol. 20. No. 6. pp. 866–871. Résultats de la conférence de la fièvre jaune à Dakar (23 avril–1 mai 1928). [**Results of the Yellow Fever Conference at Dakar.**]

LE MOIGNIC. Une conférence sur la fièvre jaune (Dakar, 23–28 avril 1928).—*Presse Méd.* 1928. July 25. Vol. 36. No. 59. pp. 939–940.

The reports of this conference which was held at Dakar, at the end of April, 1928, under the presidency of Dr. LASNET, are of considerable interest, as it included representatives from practically all the colonies on the West Coast of Africa.

The more important facts to which attention is called are the following :—

(1) The susceptibility of the rhesus monkey to yellow fever.

(2) The absence of leptospirae in African cases of yellow fever, a fact admitted by NOGUCHI himself, and consequently the doubtful value of any vaccine prepared from these organisms.

(3) The importance of albuminuria in the diagnosis of abortive or early cases of the disease, and the necessity of repeated systematic examinations of the urine in all suspicious cases of fever, in natives, as well as Europeans, when there is any possibility of yellow fever being present.

(4) The frequency of the disease in the native population, especially in the Gold Coast and at Lagos, and consequently the necessity of applying the same prophylactic regulations to both the white and coloured community.

(5) The necessity of friendly co-operation between all the countries on the West Coast of Africa, in order to establish the best methods of dealing with outbreaks. The sanitary services should be in close relationship, and their officers should visit the various colonies in order to study local conditions ; also in the future it is considered desirable to form an international health bureau at some convenient place on the West Coast.

(6) The yellow fever epidemic in Senegal has been effectively dealt with by the adoption of very strict sanitary regulations, but the port of Dakar is considered to require especial attention in view of its large mixed population and rapid growth.

The conference were also of the opinion that all cases of pestilential diseases occurring in West Africa should be notified by telegraph and without delay by the Governor of that colony to all other Governors of West African colonies. With regard to yellow fever, no case should be notified officially until the diagnosis has been confirmed either by inoculation into *Macacus rhesus* or by the development of definite

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clinical symptoms; or by post-mortem findings. A clear distinction should be drawn between imported cases of the disease and those in which the infection seems to have been acquired locally.

Attention is drawn to the fact that the rhesus monkey is very susceptible to yellow fever, and although the virus soon disappears from the blood of patients, yet if kept *in vitro* the virus will persist for an indefinite period [*ante*, p. 539] and may be sent to a central laboratory for testing.

Recent investigations have shown that yellow fever occurs in the native population in all forms, from very mild up to the severe fatal cases. The importance of this fact from an epidemiological view hardly requires emphasizing.

Finally, the conference called attention to the possibility of infection being acquired by the virus in the blood of yellow fever cases passing through the skin.

E. Hindle.

DUPONT. La fièvre jaune au Sine-Saloum en 1926. [**Yellow Fever in Sine-Saloum, Senegal, in 1926.**]—*Rev. Méd. et Hyg. Trop.* 1928. May–June. Vol. 20. No. 3. pp. 65–79. With 1 text fig.

A record of the cases of yellow fever in this district, dates of their appearance and notes on the symptoms. The paper should be read in its entirety by those interested in the epidemiology of this disease, as the observations clearly indicate the difficulty of this problem, especially in view of the great variation of the symptoms of yellow fever in different cases.

A summary of the results shows the great importance of anti-mosquito campaigns, for in the town of Kaolack, where larvae were continually being destroyed, there were only 3 or 4 cases amongst about 600 white population (0·5 to 0·7 per cent.) whilst in the small stations up country in the bush there were 18 to 22 cases amongst 199 whites, (9 to 11 per cent.)

E. H.

LASNET. Note sur la fièvre jaune au Sénégal en 1927. [**Notes on Yellow Fever in Senegal during 1927.**]—*Bull. Acad. Méd.* 1928. July 3. Year 92. 3rd Ser. Vol. 100. No. 27. pp. 758–764.

After an interval of fourteen years yellow fever reappeared in Senegal towards the end of 1926 and during 1927, between May and December. Excluding natives there were 190 cases, of which 135 died. These were all proved cases of the disease and in addition there were a number of suspected cases which were not sufficiently typical to be included in these totals, but were most probably yellow fever; also, especially in the case of young children whose parents were attacked, suspicious cases of slight fever sometimes followed by mild jaundice and traces of albuminuria. With regard to the clinical symptoms, there was frequently no relation between the temperature and pulse during the early stages of the disease. Albuminuria occurred from the second or third day up to 24 to 30 gms. and peptones were also generally present. Death was generally preceded by anuria, or by haemorrhage of the stomach. The most favourable sign was urinary discharge, and a sudden fall in the quantity of albumin with the appearance of biliary pigments in the urine.

No effective treatment is known and Noguchi's vaccine and serum were found to be useless; 500 injections of bismuth salts were made with negative results.

The author also gives useful notes on the diagnosis of the disease and points out that it is practically impossible to be certain in the early stages. During epidemics, therefore, any febrile cases of unknown origin should at once be protected by mosquito nets in order to guard against the possibility of an infection being transmitted.

With regard to the sanitary arrangements, very strict measures were taken by the government in Senegal and any persons infringing the laws were liable to heavy fines and imprisonment for periods of three months to two years. These measures were mainly based on the well-known fact that the disease is transmitted by *Aëdes aegypti*. Anti-mosquito campaigns were energetically carried out, and the public health budget was increased from 1,100,000 francs to 3,000,000 francs. Thanks to these measures, for which the author was mainly responsible, the spread of the disease in the Colony was arrested. Finally an extract is given of the results of the yellow fever conference.

E. H.

AUDIBERT. La fièvre jaune en Afrique occidentale française en 1927. [**Yellow Fever in French West Africa in 1927.**]—*Bull. Office Internat. d'Hyg. Publique.* 1928. June. Vol. 20. No. 6. pp. 883–885. [1 ref.]

A record of the number of cases arranged according to locality, time of year and race. The monthly distribution of the cases was as follows:

| | | |
|---|---|---|
| May ... ... ... ... ... | 13 cases | 7 deaths |
| June ... ... ... ... ... | 25 ,, | 12 ,, |
| July ... ... ... ... ... | 12 ,, | 9 ,, |
| August ... ... ... ... ... | 24 ,, | 21 ,, |
| September ... ... ... ... | 41 ,, | 29 ,, |
| October ... ... ... ... ... | 46 ,, | 32 ,, |
| November ... ... ... ... | 23 ,, | 19 ,, |
| December ... ... ... ... ... | 6 ,, | 6 ,, |

[A total of 190 cases with 135 deaths is thus recorded, but these were exclusively amongst the foreign population and it is incredible that none should have occurred amongst the native population. See below, p. 847, for further notes on this subject by SOREL.]

E. H.

BUCHANAN (George S.). La fièvre jaune dans l'Afrique occidentale britannique. [**Yellow Fever in British West Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1928. June. Vol. 20. No. 6. pp. 872–878. [1 ref.]

A history of the recent yellow fever epidemic in the Gold Coast with notes on recent observations. Attention is drawn to the fact that in the Gold Coast epidemic at Accra, all European and Syrian cases occurred amongst those living in the native parts of the town, and when this white population was made to live in the European neighbourhood, no other cases were observed, except in a Syrian who disobeyed the regulations. The report should be read in its entirety by those interested in the subject.

E. H.

JAMES (S. P.). La fièvre jaune dans l'Afrique occidentale britannique. [**Yellow Fever in British West Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1928. June. Vol. 20. No. 6. pp. 879–882. With 2 maps.

A record of the manner in which the yellow fever virus was first transported to Europe [*ante*, p. 539] and subsequently sent by HINDLE to the Pasteur Institute at Paris. Col. James, himself, transported the virus from London to Paris, where the disease is being studied in Professor PETTIT's laboratory. Attention is drawn to the importance of now being able to study the disease in European laboratories away from the natural localities in which it occurs.

Maps of the Gold Coast and Nigeria are given to illustrate the localities mentioned by Sir GEORGE BUCHANAN [see above] from which yellow fever cases were recorded in recent epidemics. The most disquieting feature of these records is the occurrence of cases of yellow fever in towns 70 to 80 miles from the coast, and indirect evidence that the disease seems to have extended its range in recent years. It is suggested that Ibadan, a large town in Nigeria surrounded by a densely populated neighbourhood, may be an endemic centre in Nigeria.

E. H.

VAN CAMPENHOUT (J.). La fièvre jaune au Congo belge. [**Yellow Fever in the Belgian Congo.**]—*Bull. Office Internat. d'Hyg. Publique.* 1928. June. Vol. 20. No. 6. pp. 886–896. With 2 maps. [1 ref.]

Two cases were recorded at Matadi in 1912 and another six in 1917, but these seemed to have been sporadic cases, and the disease evidently did not become established amongst the native community, since in the recent outbreak the natives showed no immunity.

From December 12th, 1927 to the end of January, 1928, there were 41 cases at Matadi: 21 in Europeans, of whom 11 died, and 20 in natives, with 15 deaths, followed by an isolated case in February. The disease seems to have been introduced by steamers from either Senegal or French Guinea, as the ships coming from there remain 3 or 4 days at Matadi. The symptoms were typical. Treatment with electrargol is said to have given good results, according to the local medical officer, Dr. CHRISTIAENS.

The methods taken by the Government to cope with the disease are described in detail. With regard to the future, the position at Matadi is considered to be disquieting and there seems a possibility of further outbreaks occurring during the next hot season. Consequently, especial attention is being devoted to the destruction of mosquitoes at this port.

Finally, the writer gives a list of the number of places, extending from Matadi to Tanganyika, at which *Aëdes aegypti* has been captured and draws attention to the danger of yellow fever spreading to the interior of the colony and thence across Africa.

E. H.

WEHRLE (W. O.). Das Gelbfieber in Liberia 1925 und 1927. [**Yellow Fever in Liberia in 1925 and 1927.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Aug. Vol. 32. No. 8. pp. 401–406.

Until 1925 Liberia was supposed to be free from yellow fever, but the author brings forward convincing evidence in support of the view

that the disease has been endemic in that region for a very long time, and occasionally assumes the form of an epidemic, as in 1925 and 1927. The relatively small European population and scarcity of doctors make it difficult to get definite information, but the existence amongst the natives of a disease known as "black jaundice" or "yellow jaundice," associated with black vomit, is very suggestive of yellow fever.

The author gives records of a number of cases of yellow fever in Monrovia, among Europeans, Syrians and natives. The mortality amongst the former was 100 per cent., and it is of interest that cases which had received prophylactic inoculations of NOGUCHI's leptospiral vaccine succumbed to the infection. Moreover, the serum provided by the Rockefeller Institute was also found to be entirely without effect.

Finally, it is remarked that in the near future there is no likelihood of the disease being suppressed in Liberia by means of sanitary measures, for even in the British and French Colonies such measures have only succeeded in a few places, such as Sierra Leone.

E. H.

SOREL (F.). Epidémie de fièvre jaune à Dakar en 1927. [**The Yellow Fever Epidemic at Dakar in 1927.**]—*Bull. Soc. Path. Exot.* 1928. July 11. Vol. 21. No. 7. pp. 503–508.

——. La fièvre jaune chez les indigènes à Dakar en 1927. [**Yellow Fever among the Natives at Dakar in 1927.**]—*Ibid.* pp. 509–511. With 1 chart in text.

The author, who was in charge of the campaign against yellow fever in Senegal, gives an interesting discussion of the 1927 epidemic. Concerning the number of cases, it is impossible to arrive at any definite conclusions, for when a disease of this nature suddenly appears after a long interval, many of the early cases are not diagnosed. Moreover, the symptoms are uncertain and not easily recognized, so many cases may occur without being recognized. A very good example of this was furnished by a Syrian who came into hospital in December, 1927, when the authorities were familiar with the disease. The case was first diagnosed as one of yellow fever and then this opinion was definitely rejected. Fortunately, mosquitoes had been fed on this patient by Dr. SELLARDS, and this observer in conjunction with MATHIS and LAIGRET, produced typical yellow fever in a *Macacus rhesus* which was bitten by these mosquitoes. [*Ante*, p. 538. Incidentally, this is the strain which was brought back to this country, as recorded by SELLARDS and HINDLE, *ante*, p. 539.] It is evident, therefore, that cases of yellow fever occur without being diagnosed and until there is some certain method of recognizing the disease, it is not possible to estimate to what extent it is present in any given community.

The second paper deals with the possibility of yellow fever occurring amongst the natives of Senegal. The mortality curve for 1927 showed a sharp rise in June and July, when the yellow fever epidemic was starting, and there is a strong suspicion that the very large increase in the number of deaths among the natives at this time was due to unrecognized yellow fever.

E. H.

BAUVALLET (H.). Index stegomyia et fièvre jaune. [**Stegomyia Index and Yellow Fever.**]—*Bull. Soc. Path. Exot.* 1928. Apr. 18. Vol. 21. No. 4. pp. 325–327.

The author gives tables indicating the number of breeding places containing Stegomyia larvae which were destroyed at Cotonou (Dahomey) during the years 1925, 1926, and the first seven months of 1927. Taking the number of habitations as 3,000, the index figure indicating the number of breeding places found increased from 1·17 to 2·74 per cent. Probably as a result of these energetic prophylactic measures, no cases of yellow fever were observed during this period.

E. H.

PUBLIC HEALTH REPORTS. 1928. Aug. 3. Vol. 43. No. 31. pp. 2031–2040.—**Yellow Fever Investigations in West Africa** [p. 2031.] **Yellow Fever in British West Africa. Report prepared by the Colonial Office, London, and Communicated to the May, 1928, Session of the Permanent Committee of the International Office of Public Hygiene by Sir George Buchanan, Delegate for Great Britain** [pp. 2031–2037]. **Resolutions of the West African Conference on the Control of Yellow Fever and other Diseases** [pp. 2037–2040].

The first part of this report is a translation of the article reviewed above p. 845.

The second part is a translation of the resolutions of the West African yellow fever conference. [See above, p. 843].

E. H.

BAUER (Johannes H.) & HUDSON (N. Paul). **The Incubation Period of Yellow Fever in the Mosquito.**—*Jl. Experim. Med.* 1928. July 1. Vol. 48. No. 1. pp. 147–153. [7 refs.] [Commission on Yellow Fever, Rockefeller Foundation, Lagos, Nigeria, West Africa.]

Working with a West African strain of yellow fever, the authors found that the virus was present in an infectious form in *Aëdes aegypti* throughout the extrinsic incubation period, as demonstrated by the inoculation of the bodies of mosquitoes into normal monkeys at daily intervals after having been fed on an infected animal. At a temperature varying between 74° and 90° F., the mosquitoes became infective, in one experiment on and after the ninth day, and in two experiments, on the twelfth day after having fed on an infected animal. The pathological changes produced by inoculation of infected mosquitoes, at all stages of infection, were typical of experimental yellow fever. [The results of previous observers suggested that 12 days was the usual incubation period, but the above results show that under certain conditions this period may be as short as nine days. Doubtless, varying degrees of temperature would influence the length of the incubation period, as in the case of other infections transmitted by biting flies.]

E. H.

BAUER (Johannes H.). **The Transmission of Yellow Fever by Mosquitoes other than** *Aëdes aegypti*.—*Amer. Jl. Trop. Med.* 1928. July. Vol. 8. No. 4. pp. 261–282. [14 refs.] Abridged version in *Jl. Amer. Med. Assoc.* 1928. June 30. Vol. 90. No. 26. pp. 2091–2092.

An interesting account of experiments on the transmission of yellow fever conducted at Lagos with the object of seeing if any other species

of mosquito could serve as a carrier of this disease in addition to *Aëdes aegypti.*

The results indicate that *Aëdes luteocephalus* and *Aëdes apicoannulatus* transmit yellow fever in all respects in the same manner as *A. aegypti.* Two lots of *Eretmopodites chrysogaster* were fed on infected monkeys and one lot produced a typical infection when fed on a normal monkey. The other lot failed to infect animals by their bite, but the insects were proved to contain the virus, as they produced infection when ground up and injected into a normal monkey twenty-four days after the original infecting feed.

*A. luteocephalus* is one of the most common species of *Aëdes* breeding in trees near human habitations and DUNN found that 74 per cent. of those around Lagos harboured this species. Consequently it must be regarded as a source of danger in the spread of yellow fever. *A. apicoannulatus* is also a breeder in tree holes, and although not so common as the former, was found in 16 per cent. of the tree holes in Lagos. Unlike *A. aegypti* and *A. luteocephalus,* this species is not restricted to the immediate neighbourhood of human habitations, but also occurs in the jungle away from any villages.

*Eretmopodites chrysogaster,* which under certain conditions obviously might serve as a carrier, does not frequent tree holes, but breeds in cut bamboos, old disused tins and similar localities. It is a voracious feeder and will readily bite man in full daylight as well as at night.

The two monkeys infected with yellow fever by the bites of these insects both showed an incubation period of ten days, which is abnormally long, but the pathological changes produced were identical with those in typical cases of the disease. It is noteworthy that a mosquito belonging to an entirely different genus from *Aëdes* should thus be capable of acting as a carrier.

Experiments with *Aëdes apicoargenteus* gave entirely negative results, both by biting experiments and the inoculation of the contents of insects that had fed on infected animals.

*Aëdes longipalpis, A. welmani* and *Culex nebulosus* refused to feed on monkeys and therefore could not be tested as regards the possibility of their acting as carriers of infection.

E. H.

KLIGLER (I. J.). **Attempts to infect** *Aëdes aegypti* (*Stegomyia fasciata*) **of West Africa with** *Leptospira icteroides* **by Feeding on Infected Guinea Pigs and on Culture Suspensions.**—*Amer. Jl. Trop. Med.* 1928. July. Vol. 8. No. 4. pp. 283–297. [3 refs.] [Lab. West African Yellow Fever Commission, Lagos, Nigeria.]

Using the Palmeiras 3 strain of *Leptospira icteroides* and *Aëdes aegypti* from both West Africa and Palestine, the author found hat the leptospirae never remained alive in the gut of the mosquito for more than ten to twelve hours, and after sixteen hours disappeared entirely. Numerous transmission experiments with these insects gave uniformly negative results indicating that *Aëdes aegypti* is not the carrier of *L. icteroides.* [These results confirm those of GAY and SELLARDS, who used an Havana strain of mosquitoes and a rather more virulent strain of *L. icteroides. Ante,* p. 104.]

E. H.

KLIGLER (I. J.) & ASHNER (M.). **The Leptospiricidal Power of Extracts of** *Aëdes aegypti* (*Stegomyia fasciata*).—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Aug. 22. Vol. 22. No. 2. pp. 181–184. With 2 figs. on 1 plate. [8 refs.] [Dept. Hyg., Hebrew Univ., Jerusalem.]

The authors ground up a number of *Aëdes aegypti* with distilled water and filtered the emulsion through a Zeitz filter. The filtrate was found to kill cultures of *Leptospira icteroides* in dilutions of 1 in 4 to 1 in 8. The property was partly destroyed by heating to 60° C. for 30 minutes. These results confirm the generally accepted view that this organism cannot live in Aëdes for more than a few hours.

E. H.

PETTIT (Auguste) & STEFANOPOULO (Georges). Absence d'anticorps pour les spirochètes ictérigènes et voisins, dans le sang des sujets atteints de fièvre jaune. [**Absence of Antibodies against Spirochaetes in the Blood of Yellow Fever Patients.**]—*C. R. Soc. Biol.* 1928. June 29. Vol. 99. No. 22. pp. 256–258.

In the course of a visit to Senegal last year, the authors collected the serum of a number of yellow fever patients, six during the disease and eight during convalescence, or after recovery. These sera were tested agaisnt *Leptospira icteroides, L. icterohaemorrhagiae, L. pseudo-icterohaemorrhagiae, L. hebdomadis,* and *L. autumnalis* types A and B. In every case there was no sign of the presence of any lysins, agglutinins, or immune bodies for any of the above mentioned organisms.

E. H.

FOWLER (Sir James K.). **Annual Report of the Beit Memorial Trustees.** —*The Times.* 1928. July 16th. p. 9.

This report contains a record of unpublished experiments by HINDLE, proving that the yellow fever virus, in the liver or blood of an infected monkey, may be dried *in vacuo.* In this dried state the virus seems to retain its properties indefinitely, and even in the presence of air was found to be still active after three to four weeks.

E. H.

PETTIT (Auguste), STEFANOPOULO (G.) & AGUESSY (Cyrille). Le virus de la fièvre jaune. [**The Yellow Fever Virus.**]—*C. R. Soc. Biol.* 1928. June 29. Vol. 99. No. 22. pp. 258–260.

The authors briefly record their experiments with the Senegal virus used by SELLARDS and HINDLE [*ante,* p. 539], which was sent to the Pasteur Institute by the reviewer. Up to date nineteen *Macacus rhesus* have been infected by the inoculation of infected liver material and the symptoms and pathological appearances agree with those previously described [*loc. cit.*, pp. 537 and 539].

Bismuth compounds were administered to four monkeys as a preventive and in each case completely checked the development of the disease. No details are given but further work is in progress. Four others were inoculated with a vaccine prepared from the liver of yellow fever monkeys and found to be protected.

These results confirm HINDLE's discovery of the protective value of yellow fever vaccines prepared from the livers of infected animals, after either killing or attenuating the virus [*loc. cit.*, p. 539].

E. H.

PETTIT (Auguste), STEFANOPOULO (Georges) & KOLOCHINE (Constantin). Sur la réceptivité des singes au virus de la fièvre jaune. [**The Susceptibility of Monkeys to Yellow Fever.**]—*C. R. Soc. Biol.* 1928. June 29. Vol. 99. No. 22. pp. 260–261.

The authors inoculated large doses of yellow fever virus into the following African monkeys with negative results:—2 *Cercopithecus griseo-viridis*; 2 *Cynocephalus hamadryas*; and 1 *C. papio*. Two *Macacus sinicus* were infected. One succumbed to the disease 4 days after being inoculated; the other suffered from a mild attack and recovered.

E. H.

MARCHOUX (E.). L'homme est moins sensible que le *Macacus rhezus* au virus de la fièvre jaune. [**Man is less Susceptible to the Virus of Yellow Fever than** *Macacus rhesus*.]—*C. R. Acad. Sci.* 1928. July 23. Vol. 187. No. 4. pp. 260–261.

According to the author, Dr. BEUUWKES at the yellow fever conference this year, made the surprising statement that the yellow fever virus would pass through the intact skin of the monkey, but not through the mucous membranes. Experiments were made at the Pasteur Institute, Paris, with SELLARDS' and HINDLE's strain of the virus, and the results obtained were the opposite of those stated above. The virus placed on the intact skin of a monkey failed to infect, whilst the same virus placed on the conjunctiva, or on the scarified surface of the skin, produced typical yellow fever infections. Finally, the author states that through the bursting of a syringe, one of his colleagues received fresh yellow fever virus from a dead monkey on to his face and into his eyes, without contracting the disease.

[By a curious misprint, the number of experiment 2 is given as 3, in two places, thus somewhat confusing the results.

With reference to the incident recorded at the end of the paper, the reviewer is strongly of the opinion that Dr. Marchoux' colleague was exceptionally fortunate, as indicated by the occurrence of laboratory infections, especially that of Dr. Adrian STOKES, in which the possibility of mosquito infection seems to have been absent.]

E. H.

PETTIT (Auguste), STEFANOPOULO (Georges) & FRASEY (Victor). Sérum anti-amaryllique. [**Anti-Yellow Fever Serum.**]—*C. R Soc. Biol.* 1928. July 27. Vol. 99. No. 25. pp. 541–542. [1 ref.]

The authors have injected large quantities of infected liver material from monkeys dead of yellow fever, into two horses, two species of baboons (papio and hamadryas) and a Cercopithecus. Serum from each of these animals was mixed with yellow fever virus from the liver

of an infected monkey and after being in contact for 30 minutes, inoculated into *Macacus rhesus*. None of the five animals inoculated showed any signs of the disease, whilst a monkey inoculated with a mixture of infected liver and serum from a normal baboon, died of yellow fever on the eighth day.

[In addition monkey A suffered from a non-fatal attack of yellow fever, but it is not clear from the article what serum was used in this experiment.]

E. H.

ARAGÃO (Henrique de Beaurepaire). Observações sobre a febre amarella no Brasil. [**Observations on Yellow Fever in Brazil.**]—*Brasil-Medico.* 1928. July 7. Vol. 42. No. 27. pp. 727–729. With 2 text figs. [1 ref.]

The presence of some yellow fever cases in Rio de Janeiro afforded the opportunity of testing whether the same results could be obtained by inoculation of *Macacus rhesus* and *M. cynomolgus* in Brazil as in West Africa. Three *M. rhesus* were inoculated with the blood of patients, two on the second to third day of the disease and one on the third to fourth, and one with 2 cc. of a culture of *L. icteroides* isolated by NOGUCHI in Palmeiras (Bahia). None of the monkeys was affected. The author next inoculated a *M. rhesus* and a *M. cynomolgus* with 10 cc. of the blood of mild cases on the first-second day of the disease, 5 cc. intraperitoneally and 5 cc. intramuscularly. Both died, the former on the fifth day, the latter on the seventh, and the post-mortem findings were typical. The effects of the Brazilian yellow fever are the same as that in West Africa. In none of 15 cases of yellow fever could *L. icteroides* be found by direct examination of the blood or urine, or in cultures or sections.

The authors tried complement fixation tests in eight cases, with the serum of patients on the first and second days of the disease as antigen, and the sera of convalescents on the eighth to fifteenth days, but with negative results in all. The experiments are still in progress.

H. Harold Scott.

HOFFMANN (W. H.). Die Leber beim afrikanischen Gelbfieber. [**The Liver in African Yellow Fever.**]—*Virchows Arch. f. Path. Anat. u. Physiol.* 1928. Vol. 266. No. 3. pp. 769–787. With 11 figs. (1 coloured).

The author has studied the histology of the liver in a number of cases of yellow fever from West Africa and finds the appearances typical of the disease and identical with those observed in American cases. These changes are described in detail and illustrated by excellent figures. In the main the author's results agree with those previously described and in particular with KLOTZ and SIMPSON's, reviewed in this *Bulletin, ante,* p. 112. The fatty degeneration and intense destruction of the liver cells constitute the most characteristic features, and furnish a method of distinguishing yellow fever from infectious jaundice and certain cases of poisoning which may simulate that disease [*ante,* p. 542].

E. H.

HOFFMANN (W. H.). El diagnostico histo-patologico de la fiebre amarilla. [**The Histological Diagnosis of Yellow Fever.**]—*Sciencia Med.* 1928. Apr. Vol. 6. No. 4. pp. 153–159. With 6 figs. [Finlay Lab., Manila, Havana.]

This paper is a short statement of the author's well known description of the morbid histology of yellow fever. It is illustrated by six excellent microphotographic reproductions of the pathological changes set up, five of the liver and one of the kidneys. The former show well the fatty degeneration and necrosis of the cells of the liver, with an intermingling of a few apparently intact cells at the centre and at the periphery of the lobules; the lime casts in the renal tubules are clearly seen in the last picture.

So characteristic are these changes that the author affirms that in all doubtful cases in which death has occurred with any suspicion of yellow fever, a small portion of the liver and kidney should be removed for histological examination to clinch the diagnosis.

H. Harold Scott.

JUNIOR (Vianna). Considerações sobre a etiologia e prophylaxia da febre amarella. [**On the Aetiology and Prophylaxis of Yellow Fever.**]—*Brasil-Medico.* 1928. May 26. Vol. 42. No. 21. pp. 562–568. [5 refs.]

The author in this paper gives many quotations from the reports of various workers on the subject and concludes: (1) That the *Leptospira icteroides* of NOGUCHI is the causative organism of yellow fever; (2) That Pfeiffer's phenomenon as carried out by Noguchi and his co-workers confirms this aetiological relationship; (3) Prolonged cultivation or repeated inoculations of the *L. icteroides* render it more closely allied to *L. icterohaemorrhagiae* and "accounts for the failures of other investigators to obtain positive results;" (4) Cultures of Leptospira recently isolated from a human case are needed, if positive results are to be obtained [First catch your hare!]; (5) The possibility of transformation of saprophytic leptospirae from water into pathogenic forms suggests the hypothesis of a natural reservoir of the yellow fever virus.

[These conclusions have now been generally abandoned.]

H. Harold Scott.

AGRAMONTE (Aristides). Consideraciones acerca del agente etiologico en la fiebre amarilla. [**On the Causative Agent of Yellow Fever.**]—*Sciencia Med.* 1928. June. Vol. 6. No. 6. pp. 295–301. [13 refs.]

The author, who never believed in either the bacillus or *Leptospira icteroides*, and who has, with GUITÉRAS and others, again and again expressed his doubts, once more recapitulates his reasons for regarding the cause as still unknown. The *L. icteroides* shows no valid specific differences from *L. icterohaemorrhagiae* and no vaccine made with *L. icteroides* is of any value, either preventive or curative, in yellow fever.

H. Harold Scott.

HUDSON (N. Paul). **The Pathology of Experimental Yellow Fever in the *Macacus rhesus*. I. Gross Pathology. II. Microscopic Pathology. III. Comparison with the Pathology of Yellow Fever in Man.**—*Amer. Jl. Path.* 1928. Sept. Vol. 4. No. 5. pp. 395–405. With 3 figs. on 1 plate. [3 refs.]; pp. 407–418. [2 refs.]; pp. 419–429. With 20 figs. on 5 plates. [17 refs.]

The first of these articles comprises a description of the gross pa hology of 68 *Macacus rhesus* which died of yellow fever, all having been infected in various ways with a strain of virus isolated from Asibi, an

African native. The gross findings showed no variations that could be attributed to the method of infection, whether by mosquito or direct inoculation. The principal lesions were jaundice, haemorrhage, and pallor of various parts, and the changes in the liver, spleen and kidney. The jaundice usually appeared as light yellow to lemon coloured, sometimes with a greenish tinge and was almost constantly present on the surface of the great vessels near the heart and on the larynx. It could often be seen in the upper part of the face and eyelids, and the tarsal conjunctivae showed distinct jaundice in 30 cases and slight colouring in 17 others. Pallor was often seen in the buccal, gastric, and intestinal mucosa.

Haemorrhages occurred in many parts of the body, such as the base of the teeth. Petechial haemorrhages in the form of bright red dots 2 to 4 mm. in diameter on the surface of the lungs were observed in about two-thirds of the monkeys examined. The stomach of about one-third of the animals contained variable quantities of more or less altered blood which sometimes blackened the whole stomach contents. No gross lesions could ever be found on the surface of the mucosa even when fresh red blood was present. The small intestine also showed similar haemorrhages in about one-fifth of the cases examined. The lungs practically always contained the cysts of a parasitic mite *Pneumonyssus griffithi*. The liver was always pale, either buff or yellowish " boxwood " colour, and after bleeding became either yellowish brown or cream coloured. The surface of sections appeared fatty and moreover the tissue of the liver was often soft and friable and obviously necrotic. The weight of the spleen was definitely increased in infected animals. Also the kidneys showed an increase in size over those of control monkeys. The kidneys, in section, constantly showed the presence of fine dull grey cortical rays, easily seen with the naked eye, contrasted with the surrounding pale brown tissue. The increase in the weight of the spleen seems to be due to congestion and in the kidneys to acute degenerative changes.

The second article is based on the study of 30 rhesus monkeys infected with the same strain of yellow fever. The liver was found to show fatty degeneration, necrosis, with the development of marked eosinophile staining properties. Nuclear changes were also conspicuous in many of the cells. Polymorphonuclear and endothelial leucocytes were commonly present. The renal epithelium showed fatty degeneration, cloudy swelling and necrosis, but no inflammatory cells could be found. The tubules contained hyaline, granular and, in a few instances, calcareous casts. The heart almost constantly showed fatty degeneration unequally distributed among the muscle fibres. The spleen showed congestion, diminution of lymphocytes and lymphoblasts, necrosis of lymph nodules and a marked endothelial response in the nodules and pulp. Fat was found in the necrotic areas and in the endothelial cells of the nodules and pulp. Regional lymphatic glands also showed necrosis and endothelial multiplication. The lungs and stomach gave evidence of haemorrhage without any inflammatory reaction, mild in degree and without any obvious lesions in the vessel walls. Necrosis with a polymorphonuclear reaction was common in the adrenal gland and rarely haemorrhages were also observed.

No marked changes were observed in the brain, pancreas and voluntary muscle. All examinations for bacteria, leptospirae or spirochaetes were negative and the lesions may be explained on the basis of a severe intoxication.

The third article comprises a careful comparison of the pathology of yellow fever in monkeys with that in human beings. With regard to the gross pathology, very similar processes are evident in the organs of human and monkey cases of yellow fever. Jaundice, haemorrhage of various parts, "black vomit," pallor, and fatty necrotic changes in the liver, acute degeneration of the renal parenchyma, splenic congestion and the urinary findings were present in both. Variations occurred in the intensity of these changes, but qualitatively there was a very striking parallelism as regards the jaundice, recent haemorrhages, and the appearance of the liver, kidney and spleen. The pathological histology of the two, based on the examination of 30 human cases and the monkeys recorded above, shows that fatty degeneration of the liver, kidney, heart and spleen is of the same type in man and monkey, but more extreme in the latter. Other degenerative changes in the liver, spleen and kidney are also similar, but necrosis of the adrenal glands is only rarely seen in man, although common in the monkey. In both, inflammatory cells are lacking in response to haemorrhage in any of the organs, and to changes in the kidney and heart. Polymorphonuclear and endothelial leucocytes are usually found associated with liver lesions on monkeys, but rarely in man. Haemorrhages and congestion tend to be more frequent and extensive in the liver, lungs and gastric mucosa in human cases, but in both cases the haemorrhages are focal, recent and without obvious lesions of the vessels. The necrosis of the liver is essentially midzonal with less altered cells towards the periphery of the lobules.

The appearances in both human beings and monkeys support the view that the lesions are the result of a severe intoxication, and no evidence could be obtained of any localization of the virus.

E. H.

CANNELL (D. E.). **Myocardial Degenerations in Yellow Fever.**—*Amer. Jl. Path.* 1928. Sept. Vol. 4. No. 5. pp. 431–443. [25 refs.] [Dept. Path. & Bact., Univ., Toronto.]

The author has made a detailed examination of the hearts of 29 human cases and nine monkeys infected with yellow fever. As recorded above, cloudy swelling, granular and fatty degeneration were found constantly in both, but primary inflammatory changes were not observed. Secondary response was seen in two human cases. The distribution and intensity of the degeneration was patchy and variable, fatty degeneration being most marked in the neighbourhood of the nuclei of the muscle fibres. The cause of the slow pulse is still uncertain but further investigation of clinical function and pathological changes in the bundle of His may lead to a possible solution of the problem. The heart lesions are identical in both human beings and *Macacus rhesus*; in themselves they are not sufficient to make a diagnosis of yellow fever.

E. H.

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DE ARAUJO (Eduardo). O problema da etiologia da febre amarella. (Estudo analytico.)—*Brasil-Medico.* 1928. July 21. Vol. 42. No. 29. pp. 781–790. [88 refs.]

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## KALA AZAR.

Ross (William C.). **Report on the Kala Azar Survey in Patna City August–November, 1923.**—13 pp. With 1 folding map. 1928. Patna.

The paper describes a survey which was instituted in parts of Patna for the purposes of throwing light on factors which might influence the incidence of kala azar. The population of 7,897 holdings was investigated. They included 25,311 Hindus, 10,561 Mohammedans and 190 Christians. The returns showed 162 cases of kala azar which gave an incidence of 4·5 per thousand of population. Such factors as sleeping habits, domestic water-supply and occupation, did not appear to influence the occurrence of the disease. As regards site incidence, the distribution of the cases is roughly in proportion to the density of population. Of the 162 cases, 138 were single cases in separate houses, while only 24 multiple cases occurred in 11 houses. Religion was a more important factor, for amongst the 25,311 Hindus there were 95 cases and amongst the 10,561 Mohammedans 66 cases. The incidence amongst the former was therefore 3·7, and amongst the latter 6·2. During the 4 years 1920 to 1923, 3,076 cases were treated at the Patna hospitals. This gives for the population an incidence of 6·5 per thousand and 10·6 and 5·2 for Mohammedans and Hindus respectively. As the general mortality rate for the two classes for the whole of Bihar and Orissa for ten years is approximately the same, it is evident that there is an actual excess of incidence of kala azar amongst Mohammedans. The only fundamental difference from the health point of view of the two classes is in the eating habits, a fact which indicates to the author that the probable source of infection is in the food and that the parasite invades the body through the intestinal tract. Sex has little influence for, though more cases are seen amongst males, the reluctance of the people to reveal their female relatives suggests that the disease probably affects both sexes more or less equally. With reference to age, if the age distribution of the disease is considered with the age distribution of the population, it is found that kala azar is most common in children, but is at the same time very frequent in adults and cannot be considered to be characteristically a disease of youth. It is rarely seen below the age of two, though infants are at least as liable to be bitten by insects as adults. Malaria affects the youngest infants, so that it is very difficult, if not impossible, to reconcile the fact with any theory of insect transmission of kala azar. From the housing incidence as it revealed the condition of sanitation, the remarkable fact emerged that masonry houses, with masonry privies built according to the prevailing idea of progress, are of all houses the most unhealthy from the kala azar point of view. The poor man in his mud hut is thus much better off than his rich neighbour. The general conclusion is reached that the survey indicates that kala azar is not transmitted by biting insects, but that infection takes place through the intestinal tract.

C. M. Wenyon.

BHATTACHARYYA (Pasupati). **The Antimony Test in the Early Diagnosis of Kala-Azar.**—*Indian Med. Gaz.* 1928. Mar. Vol. 63. No. 3. pp. 123–126.

An examination of 51 cases of fever with enlargement of the spleen at the police hospital in Calcutta has convinced the author of the value of the antimony test in the diagnosis of early cases of kala azar. Apart from very chronic cases of malaria, tubercle or syphilis, cases of fever other than kala azar do not give a positive result.

C. M. W.

BOSE (A. N.), DASTIDAR (S. K. Ghosh) & BAGCHI (B. N.). **Observations on the Antimony (Urea-Stibamine) Test for Kala-Azar.**—*Indian Med. Gaz.* 1928. July. Vol. 63. No. 7. pp. 370–372. [5 refs.] [Prince of Wales's Med. Coll., Patna.]

The authors have experimented with the antimony test for kala azar, employing urea stibamine. From the study of a number of diseases they conclude that the best result is obtained by using a 1 in 10 dilution of serum and a 4 per cent. solution of urea stibamine. With these concentrations the reaction appears to be a specific one for kala azar serum.

C. M. W.

CHOPRA (R. N.) & CHAUDHURI (S. G.). **Studies in the Physical Properties of Different Blood Sera. Part I. Iso-Electric Points of Blood Sera and their Significance in the Antimony Test for Kala-Azar.**—*Indian Jl. Med. Res.* 1928. Apr. Vol. 15. No. 4. pp. 895–905. [21 refs.] [Calcutta School of Trop. Med., Calcutta.]

The authors describe a method for the determination of the iso-electric points of albumin and globulin in serum under different pathological conditions and have shown that these are 5·5 and 3·8 respectively. In some lepers and in kala azar cases the iso-electric point of albumin is 4·0. The precipitate formed by the addition of a solution of urea stibamine to kala azar serum is mainly euglobulin. The antimony test for kala azar can be explained on the basis of no change in the iso-electric points, increase in the globulin-albumin ratio and diminution of buffer reaction.

C. M. W.

GILKS (John L.). **Kala-Azar.**—*Colony and Protectorate of Kenya. Ann. Med. Rep. for the Year ending 31st December, 1921.* p. 86.

Two cases of kala azar as contracted in the North Frontier District of Kenya are described. The first case was that of an Administration Cadet on his first tour of service. With the exception of war service in France, he had never been out of England before he came out and was stationed at the Northern Frontier. Diagnosis was made by liver puncture. The second case was in a Somali woman from the same district.

C. M. W.

NAPIER (L. Everard) & GUPTA (C. R. Das). **Indian Kala-Azar in a Newly-Born Child.**—*Indian Med. Gaz.* 1928. Apr. Vol. 63. No. 4. pp. 199–200. With 1 text fig. [5 refs.]

The paper describes a case of kala azar in an infant in its eighth month of life. The history of the case, the size of the spleen and the condition of the blood indicated that the infection had lasted at least 4 months. The child had been breast fed from birth, while the mother and another child 3 years of age were quite healthy. The incubation period in this case was certainly less than 3 months.

C. M. W.

CHOPRA (R. N.), GUPTA (J. C.), MULLICK (M. N.) & GUPTA (A. K. Dutt). **Urea-Stibol in the Treatment of Kala-Azar.**—*Indian Med. Gaz.* 1928. May. Vol. 63. No. 5. pp. 252–253. [1 ref.] [Carmichael Hosp. for Trop. Diseases, Calcutta.]

J. C. DAS and S. C. BHAWAL introduced to the authors a compound called "urea-stibol" which they claimed to be a salt of urea and p-amino-phenyl-stibinic acid and not p-carbamino-phenyl-stibinate of ammonia, which is the chemical name of "urea stibamine." The pharmacological action of "urea-stibol" was similar to those of other pentavalent aromatic compounds of antimony, while its toxicity in white mice varied between 220 and 230 mgm. per kilogram of body weight when administered intravenously. Tested in fifteen cases of kala azar it gave results which were in no way inferior to those obtainable with "urea-stibamine" or "stiburea." The substance is a white hygroscopic powder easily soluble in water, forming a clear deep brown solution.

C. M. W.

RAY (Iyotis Chandra). Intrakutanreaktion zur Diagnose der experimentellen Leishmaniosen (Kala-Azar, Orientbeule). [**An Intracutaneous Reaction for Diagnosis of Experimental Leishmaniasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. July. Vol. 32. No. 7. pp. 369–376. [5 refs.] [Inst. for Ship & Trop. Diseases, Hamburg.]

Various types of antigen were prepared from cultures of *Leishmania tropica* and *L. donovani.* With these the possibility of obtaining a skin reaction in hamsters infected with *L.donovani* and *L.tropica* was tested. It was found that a specific reaction was given by the hamsters, as also by rabbits which had been immunized with cultures.

C. M. W.

MUKHERJEE (Harendra Nath). **A Simple Method for the Finding of Leishman-Donovan Bodies and Malarial Parasites in the Venous Blood.**—*Calcutta Med. Jl.* 1928. Mar. Vol. 22. No. 9. pp. 487–488. [4 refs.] [Carmichael Med. College, Calcutta.]

The fact that the corpuscles in blood from kala azar and malaria cases sediment rapidly may be utilized for the detection of malarial parasites or leishmania. About 1 cc. of citrated or oxalated blood taken from a vein is allowed to stand in long serological pipette tubes for 3 to 4 hours. With a fine capillary pipette a little of the clear plasma just above the red blood cell deposit, together with about 1 mm. of the topmost layer of red blood cells, is removed and placed

on a clean slide. A film is made and stained in the usual way. In sedimentation the uninfected red cells are at the bottom, those with malarial parasites next and the leucocytes in which leishmania may occur above these.

C. M. W.

MAYER (Martin) & RAY (Jyotis Chandra). Züchtung und Differentialdiagnose verschiedener Leishmanien (Kala-Azar, Orientbeule und brasilianische Leishmaniose) auf festen Nährböden.—[**Cultivation of Various Leishmania on Solid Media. Their Differential Diagnosis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. June. Vol. 32. No. 6. pp. 277–287. With 19 text figs. [1 ref.] [Inst. for Ship & Trop. Diseases, Hamburg.]

By means of the blood agar plate method of culture of NÖLLER (see this *Bulletin*, Vol. 10, p. 247) the authors have shown that different strains of leishmania produce different types of growth. With *Leishmania donovani* narrow thick streaks without true lateral outgrowths are obtained. A strain of *L. tropica* from Palestine grew luxuriantly, the streak giving off parallel, but never branching outgrowths, while two strains from Turkestan, the one more luxuriant than the other, formed outgrowths in the form of a network. A strain of S. American cutaneous leishmania grew as a thin surface film without outgrowths. Furthermore the arrangement of the flagellates at the edge of the growth as shown in impress preparations varied with the strains, while there were recognizable differences in the size, shape, staining reaction, nuclear structure and flagella of the individual flagellates.

C. M. W.

HINDLE (Edward) & THOMSON (J. Gordon). *Leishmania infantum* **in Chinese Hamsters.**—*Proc. Roy. Soc.* 1928. Aug. 1. Ser. B. Vol. 103. No. B 724. pp. 252–257. With 8 figs. on 2 plates. [4 refs.]

The paper describes the lesions produced in hamsters inoculated with a strain of *Leishmania donovani* of Mediterranean origin. The strain employed was one of those used by YOUNG and HERTIG who have noted a similar response in hamsters (*ante*, p. 424). In contradistinction to hamsters inoculated with strains of *Leishmania donovani* of Chinese origin which develop a generalized infection progressing in intensity till the time of death, with large numbers of parasites in the spleen, liver and bone marrow, those inoculated with the Mediterranean virus acquire at first a generalized infection which subsides, its place being taken by a peripheral one of the extremities and the testis. It appears that the course of the infection following intraperitoneal inoculation is an infection of the lymphatic glands followed by invasion of the liver, spleen and bone marrow, causing a generalized infection during which parasites frequently appear in the peripheral blood. Later the organisms disappear from the viscera and become localized in the tissues surrounding one or more of the distal joints of the limbs and in the tail, often producing great enlargement of these regions. The testes also become parasitized and occasionally show abscess formation. The ears and nose of a certain number of animals also show thickening, followed by ulceration. Intratesticular inoculation was followed by the same series of events. In sections of the testis of one of the hamsters it was found that there was a marked

increase in the cells in the inter-tubular spaces. These consisted of large mononuclears with intensely eosinophile cytoplasm, small connective tissue cells and a few plasma cells. No parasitized clasmatocytes were seen in the inter-tubular spaces. In certain areas the lumen of the tubule was obliterated with polymorphonuclear cells, probably the result of some secondary inflammatory condition. The sperm mother cells of the outer zone of these inflamed tubules sometimes contained numerous leishmania. No marked changes were observed in the interstitial cells of the epididymis and no parasites were found in the intertubular spaces or in the lining cells of the tubules. Sections through the feet showed that the thickening was mainly due to great proliferation of cells, mostly parasitized clasmatocytes round the ankle joint, and these infiltrated the tissues between the muscles and ligaments, but did not extend into the cavity of the joints nor into the tissues surrounding the joints of the toes. Furthermore, the bone-marrow of the lower ends of the tibia and fibula was almost entirely replaced by parasitized clasmatocytes. The marrow of the tarsals and metatarsals was in a similar condition. Examination of subcutaneous tissues of the skin in other parts of the body did not reveal parasites except in the case of the margins of the ears when obvious lesions were present. With the Chinese strain distribution of parasites in the subcutaneous tissues of the whole body is commonly found.

C. M. W.

BRAHMACHARI (Upendra Nath) & BANERJEE (Siris Chandra). **A Rare Case of Dermal Leishmanoid.**—*Indian Med. Gaz.* 1928. July. Vol. 63. No. 7. pp. 389–390. [2 refs.]

About 2 years after he came under treatment for kala azar, of which he was apparently cured by injections of sodium antimony tartrate, the patient noticed an erythematous patch over the bridge of the nose. It extended and there developed on the area a few papules without any sign of depigmentation. Scrapings from the area showed a few leishmania. The case was evidently a type of the disease previously described by the first author as dermal leishmanoid. There was no fever or enlargement of the spleen and no sign of any other infection.

C. M. W.

ARAGÃO (Henrique de Beaurepaire). [In Portuguese & English.] Leishmaniose tegumentar e sua transmissão pelos phlebotomos. **Tegumentary Leishmaniosis and its Transmission by Phlebotomi.**—*Mem. Inst. Oswaldo Cruz.* 1927. Vol. 20. No. 2. In Portuguese pp. 177–186. With 2 figs. on 1 plate. In English pp. 187–195.

——. Transmissão da leishmaniose pelos phlebotomos.—*Folha Med.* 1928. Jan. 15. Vol. 9. No. 2. pp. 13–15.

The two papers cover the same ground and discuss the transmission problem of oriental sore in South America in the light of recent results. The experimental production of oriental sore on the nose of a dog by inoculation of crushed up *Phlebotomus intermedius* is again mentioned (see this *Bulletin*, Vol. 19, p. 316). The author mentions a certain district near Rio de Janeiro in which occurred about 50 cases of the disease after the introduction of a case from another locality. Sandflies abounded in this district and were undoubtedly responsible for the

epidemic, which subsided when the nature of the disease was recognized and the cases treated. The author believes that this outbreak demonstrates that there is no reservoir of the virus but man, and that sandflies of the genus *Phlebotomus* are the sole vectors of the disease.

C. M. W.

ABIMÉLECH (Robert). Un cas autochtone de leishmaniose cutanée à Constantinople.—[**Indigenous Case of Dermal Leishmaniasis at Constantinople.**—*Ann. Dermat. et Syph.* 1928. Mar. Ser. 6. Vol. 9. No. 3. pp. 168–174. With 5 text figs.

Two women, cousins, returned to Constantinople after a stay in Ourfa where they contracted oriental sore. One of the women shared a room with her sister who had never been out of Constantinople and was frequently visited by the cousin, who stayed with her for several days. Some time after, the sister noted on the back of her right hand a tiny nodule, which developed into a typical oriental sore in which *Leishmania tropica* was demonstrated. This appears to be the first autochthonous case of the disease in Constantinople.

C. M. W.

BROSIUS (O. T.). **Dermal Leishmaniasis—Case Report.**—*Sixteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1927. pp. 162–163. [United Fruit Co. Hosp., Almirante, Panama.]

The patient had an indurated sore on the outer surface of the right arm and near it a papule which had appeared two months after the first lesion commenced. The first lesion began as a papule which appeared about a week after the patient had returned to Almirante from a 3-weeks' stay at Bocas del Toro, the seaport town distant about 14 miles from Almirante. Diagnosis was made by discovery of leishmania in scrapings of the lesion. Intravenous injections of 1 per cent. solution of tartar emetic were given on alternate days, commencing with 3 cc. and increasing by 1 cc. till 6 cc. were given on the 7th day. The last injection caused a spasmodic cough which was so severe that the patient became cyanosed and could scarcely breathe. The symptoms, however, quickly passed off. No further treatment was given. The small papule had disappeared by the 5th day and the sore had completely healed by the 10th day. There was thus a remarkably quick response under an unusually small dose of the drug.

C. M. W.

OWEN (D. Uvedale). **A Case of Oriental Sore of Seventeen Years' Duration.**—*Ann. Trop. Med. & Parasit.* 1928. June 12. Vol. 22. No. 1. pp. 43–46. With 2 figs. on 1 plate. [7 refs.]

The patient, an Englishman, contracted oriental sore in Lahore in 1910, when two small nodules appeared on the dorsal surface of the left hand and one on the right arm. By 1912 they had increased in size. The sore on the arm then healed after treatment with tincture of iodine, but those on the hand persisted and finally coalesced in spite of treatment by scraping and application of iodine. In 1926 leishmania were found in the lesion and treatment with intravenous and local tartar emetic was instituted without result. Treatment with stibosan and unfiltered X-rays again did not improve the condition, nor did a further three weeks' course of tartar emetic locally. Finally, after a further course of intravenous antimony in the form of stibosan had been given, healing commenced and was continued without interruption.

C. M. W.

JEANSELME, HUET (Léon) & HOROWITZ. Un cas de bouton d'Orient, accompagné de lymphangite scléreuse réticulée de l'avant-bras. [Examen anatomo-pathologique (docteur Ad. DUPONT).]—[**Case of Oriental Sore with Lymphangitis of the Fore Arm.**]—*Bull. Soc. Française Dermat. et Syph.* 1928. Mar. No. 3. pp. 221–225. With 2 figs.

A case of oriental sore of Syrian origin with contiguous lesions on the middle and ring fingers of the left hand, showed an oedema of the back of the hand and a diffuse lymphangitis of thickened lymphatics and nodules on the upper part of the forearm. Though leishmania were easily found in the lesions on the fingers, no parasites could be found in the nodules on the arm. The authors call attention to the frequency with which cases of oriental sore are complicated by lymphangitis, a fact which is insufficiently recognised.

C. M. W.

LÉPINE (Pierre) & HITTI (Y. K.). Le kala-azar en Syrie. [**Kala Azar in Syria.**]—*Jl. Méd. de Lyon.* 1927. Nov. 5. No. 188. pp. 565–588.

The paper describes the three cases of kala azar previously noted by the authors (see this *Bulletin*, Vol. 24, p. 148).

C. M. W.

ROSKIN (G.) & ROMANOWA (K.). Die Teilung des Kerns bei Leischmania tropica. [**Nuclear Division in** *L. tropica.*]—*Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1927. Vol. 3. German summary pp. 392–393. [In Russian pp. 181–189. With 4 figs. & 1 plate.]

A preliminary note on the subject of the paper in this *Bulletin*, Vol. 25, p. 429.

C. M. W.

## BERIBERI.

VEDDER (Edward B.) & FELICIANO (R. T.).—**An Investigation to determine a Satisfactory Standard for Beriberi-preventing Rices.**—*Philippine Jl. Sci.* 1928. Apr. Vol. 35. No. 4. pp. 351–387. With 8 text figs. & 2 plates. [7 refs.]

Endemic beriberi cannot be eradicated without legislation and this in turn depends upon the determination of a satisfactory standard for beriberi-preventing rices. Such is the idea underlying the work carried out in the Philippine Islands.

The plan of the research was as follows :—200 samples of rice grown in different localities and of all degrees of milling were collected. These rices were then examined as to the percentage of external layers of the grain still adhering and were then submitted to chemical analysis and were fed to pigeons.

The authors used a simple method for the inspection of pericarp. One hundred grains of rice are stained with Gram's Iodine solution for one minute. The iodine having been rinsed off with water, each grain is examined and the amount of pericarp remaining expressed as a percentage.

Tables, photographs and details of the work are supplied and the following are some of the conclusions. The Gram's iodine method is simple and accurate. Rices examined in this way having 50 per cent. or more of the external layers adhering never produced polyneuritis in pigeons. Human beriberi can be prevented by selecting rice in this way and it is suggested that the test should be made during the process of milling. Thus highly milled rice has 0–20 per cent. of external layers, medium milled 31–49 per cent., and under milled 50–100 per cent.

Chemically, amido-nitrogen figures are useless as an index, 1·05 per cent. ash is a poor index, 0·62 per cent. phosphorus pentoxide is better and the best single index of all is 1·28 fat. The chemical index proposed for beriberi-preventing rice is "any rice having 1·77 per cent. of phosphorus pentoxide plus fat, but not less than 0·4 per cent. phosphorus pentoxide ; or any rice having not less than 0·62 per cent. phosphorus pentoxide ; or any rice having not less than 0·5 per cent. phosphorus pentoxide and with at least 75 per cent. of the external layers of the grain thus remaining."

No rice of this chemical grade produced polyneuritis in pigeons. Thorough washing of rice reduces the phosphorus content and presumably the vitamin content also. The depredations of insects, which eat the external layers of the grain, account for the vitamin loss in stored, under-milled rice.

A. D. Bigland.

MCCARRISON (R.). **The Influence of Irrigation on the Nutritive Value of Rice.**—*Indian Jl. Med. Res.* 1928. Apr. Vol. 15. No. 4. pp. 915–920. [5 refs.] [Summary appears also in *Bulletin of Hygiene.*]

One of the outstanding features in the distribution of beriberi in the Madras Presidency is the prevalence of the disease in the low-lying, irrigated tracts of the North-East Coast and its rarity in the hot and

humid regions of the West Coast. Rice is the staple article of diet in both localities, but in the East Coast district it is grown under wet conditions (a layer of irrigation water lying in the fields from sowing until harvest) whilst in the West Coast district much of the rice is grown under dry conditions above the limit of irrigation. Samples of the same type of rice grown under wet and dry conditions were chemically analysed and no fundamental difference found. Rats were fed on the two types of rice in addition to a basal diet which was deficient in, but not devoid of, vitamins A and B. Growth was definitely superior in the group receiving the dry-crop-rice (35 and 24 per cent. better in two experiments). The author considers that the cause of the inferior nutritive power of the wet-crop-rice is the influence of irrigation. The nature of the soil on which the two samples of rice were grown varied (the wet crop on a deep, loamy clay; the dry crop on a red, slight gravelly loam), but this is not considered to account for the difference. It is concluded that the conditions of cultivation of rice, especially in regard to water supply, is an important factor in determining the endemicity of beriberi.

H. N. H. Green.

SATOV (T.). La prévention du béribéri. [**The Prevention of Beriberi.**] —*Bull. Office Internat. d'Hyg. Publique.* 1928. May. Vol. 20. No. 5. pp. 729–734.

Probably beriberi made its first appearance in Japan during the years 1186 to 1333. Since then it would seem that the disease has fluctuated considerably. The period 1688 to 1735 showed a recrudescence, which was followed by an interval of freedom. In 1801 to 1817 its reappearance was noted. About 1873 (or 1874) in one detachment of the Japanese army, one man in every three suffered from beriberi. So alarming was the incidence that the Emperor Meiji caused a special hospital to be founded. This was abolished in 1882 and was replaced by a special department at the Imperial University. In 1918 a committee for the study of beriberi was inaugurated, which carried on investigations till 1924.

During the decade 1912–1922 there was a marked increase in the beriberi death rate. The figures were always considerably higher in males than females and among dwellers in towns of 50,000 or more inhabitants. The army and navy show a similar recrudescence of the disease during the last few years.

In Japan diet alterations play a very important part in the prevention of beriberi and tables are given in proof of this statement. In 1891 the diet of the army was modified by issuing a mixture of rice and barley. This caused a notable decrease in the disease, although there were still periods of recrudescence. Latterly vitamin B products have been added to the rice-barley regime, with very satisfactory results. Similar results have been obtained in the navy. In 1883 the diet was altered and in 1886 the rice-barley regime was begun. In 1878–1883 there were 230–390 cases of beriberi per thousand sailors. In 1884 127·4 per thousand; in 1885–1886 the figure fell to 5·9 and later to 0·4. Since then the incidence has varied between 0·1 and 1·0 per thousand with a slight increase in 1919.

Prison records show analogous results.

A. D. B.

GREY (Egerton Charles). **The Pre-Beriberi Condition. With Special Reference to its Existence in Japan.**—*Jl. of Hyg.* 1928. Mar. Vol. 27. No. 3. pp. 257–267. With 3 plates. [26 refs.] [Biochem. Inst., Cambridge.]

There are a priori grounds for supposing that a pre-beriberi condition exists. The cause of deficiency disease is multiple, not single as it is with a specific infection and, therefore, we "shall expect to find leading up to the condition of obvious deficiency of a certain factor, other conditions due to the absence of one or more associated factors; in other words we might anticipate a preliminary condition leading to the deficiency disease in its characteristic form."

It is important to remember that in the prevention of deficiency disease, two conditions are essential—"the accessory factor and the factor to which it is accessory." Thus, though an adequate supply of vitamin B may hide the ill effects of an unbalanced diet, there must be an underlying weakness in the organism and this may suddenly become manifest when the vitamin is withheld. Such an underlying weakness might be expected to develop into true beriberi without any diet change merely as the result of adverse conditions, such as excessive heat or humidity, lack of exercise, fatigue or superadded intoxication of any kind.

In Japan during the months July, August and September, this state of general malnutrition passes abruptly into beriberi. It is said that the disease has begun, but it is truer to say that what was hidden has now become obvious and that for all those attacked there is a still larger number in the preliminary condition.

Evidence for such a pre-beriberi condition was looked for in two situations (*a*) The *Central Telephone Exchange, Tokyo.* This was visited by the author in June, 1927. The conditions were found to be very good and yet of the 500 women employed, 80 were incapacitated from work by a condition which was "either diagnosed or about to be diagnosed as beriberi." The women showed a state of exhaustion with anaemia, dyspnoea on exertion, enlarged heart and a rapid and irregular pulse. These cases were diagnosed as beriberi by the authorities, but the author suggests that a better explanation would be "the exacerbation of the condition of pre-beriberi which already existed."

(*b*) *The Army.* In 1923 out of 207,939 patients (recruits) 82,429 fell sick with nutritional disorders, and out of a death roll of 278 forty were due to this cause. It is to be remembered that these men had been medically examined when they entered the army and therefore may be supposed to have been reasonably fit. A similar state of affairs was found among soldiers in their second two years of training. The author is of the opinion that these facts show the presence of a pre-beriberi condition.

75 per cent. of Japanese are mouth breathers and this is probably associated with under-nourishment and leads to chronic respiratory troubles. Imperfect eyesight, a common finding, is also ascribed to poor feeding. The fact that the Japanese prefer to sit at work is taken as evidence of weakness, as is also the common custom of men and women to fall asleep in public conveyances.

It is suggested that these observations supply indirect evidence of the presence of a pre-beriberi condition.

The etiology is ascribed to "a prolonged use of a diet deficient in essential factors, as well as accessory factors, and in particular one too low in protein and too high in starch, though there is sufficient vitamin B complex to prevent, under ordinary circumstances, the appearance of beriberi." It follows that prophylactic treatment is most important, since the condition is slowly acquired and difficult to cure. Improved diet with the addition of milk, eggs and meat is advised. The gradual introduction of a staple food richer than rice in protein should do much to combat the general malnutrition.

[The incidence of sickness in the Japanese Army as shown by the figures in this paper is so extraordinary that one wonders whether some error has not crept into the statistics. According to this account, the number of conscripts recruited in 1923 was about 300,000, of which 207,939 became patients!]

A. D. B.

TAYLOR (J.), MARTIN (C. de C.) & THANT (U.). —**Preliminary Enquiry into Beri-Beri in Burma.**—*Indian Jl. Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Mar. Memoir No. 8. 104 pp. With 3 maps. [Pasteur Inst., Burma.]

The incidence of beriberi in Burma is difficult to assess, as the statistics are incomplete. Useful figures, however, were obtained from hospitals. In the years 1923 and 1924, out of 200 hospitals and dispensaries 78 returned a list of cases. In 1923 figures from these sources showed a total of 239 in-patients and 197 out-patients, and in 1924, 381 in-patients and 303 out-patients. The towns from which these figures were collected do not represent average Burma conditions either in mode of life or in the nature of the population. It may be said, however, that there is a regular annual incidence of beriberi in the larger coastal towns mainly affecting temporary Hindu immigrants from India. In the large agricultural areas the disease is relatively rare.

In special communities such as timber camps, police posts, schools, jails, lighthouses, lightships, etc., epidemics occur. The disease is found regularly in certain outlying areas of the Province, as, for example, in the Upper Chindwin.

Dietary tables are supplied showing the variety and quantity of food taken by Rangoon residents, Burmans, Mohammedans and both meat-eating and vegetarian Hindus. It was found that the average Burman has a varied and generous dietary, and this, no doubt, accounts for the relative infrequency of beriberi. Important also in this respect is the fact that rice in the villages is hand-pounded and in the towns under-milled. The Mohammedans have a similar diet to the Burmese, but slightly less in quantity of accessory food stuffs. Among the vegetarian Hindu atta as well as milk and milk products are taken in addition to rice. Atta is of value in compensating for any vitamin deficiency of the rice. The meat-eating Hindus have very varied diet habits and their food is inferior to that of the Burmese and sometimes badly balanced. The Hindu coolies frequently consume 2½ pounds of rice daily with hardly any supplementary articles of food. This doubtless accounts for the relatively heavy incidence of beriberi among this class of the population.

In Burma beriberi has a seasonal prevalence beginning about two months after the monsoon is established, reaching its height about

October and diminishing during the cold weather. The deterioration of rice stored in the husked state under damp conditions and the taking of a diet consisting mainly of rice with a minimum of accessory food stuffs are the two chief aetiological factors of the disease in Burma.

A. D. B.

MARANHÃO (J. Leite). Beriberi no collegio militar do Ceara. [**Beriberi in the Military College, Ceará.**]—*Brasil-Medico.* 1928. Apr. 7. Vol. 42. No. 14. pp. 374-377.

In the military college there resided 500 students, which number could be increased to 750. On July 5th, 1927, a case of polyneuritis appeared suddenly and within the next ten days 83 individuals were attacked. The symptoms were typical of beriberi of an average degree of severity. The general hygienic conditions were good, the food excellent in quality, and sufficiently varied. The students first attacked had recently come from Piauhy, Maranhão, and the Amazonas districts where beriberi is endemic. The explanation given is that there were one or more carriers of the *Bacillus asthenogenes*, the organisim isolated from cases of beriberi in Cochin China.

The outbreak was arrested by removal and isolation of the patients, the healthy contacts also being transferred elsewhere, while the buildings were thoroughly disinfected. One of the students who went to the neighbouring town of Maranguape developed symptoms 20 days after leaving the college, and two others out of four who went to Baturité were also attacked. [It is a matter for regret that it was not found possible to carry out experimental work with the material afforded by the outbreak here recorded.]

H. Harold Scott.

SCOTT (Leonard C.) & HERRMANN (George R.). **Beriberi ("Maladie des Jambes") in Louisiana, with Special Reference to Cardiac Manifestations.**—*Jl. Amer. Med. Assoc.* 1928. June 30. Vol. 90. No. 26. pp. 2083–2090. [16 refs.] [Louisiana State Board of Health, the New Orleans Charity Hosp. Heart Station, & Tulane Univ. of Louisiana School of Med., New Orleans.]

The authors draw attention to the occurrence of beriberi in the rice-producing parishes of Louisiana. A disease known locally as "maladie des jambes" has prevailed in the rice belt for many years. The majority of the cases occur in the autumn, during which time the people live on an exclusive diet of polished rice. In the winter months meat, potatoes and bread are added to this diet and it is stated that no new cases occur during this season of the year. The authors think it probable that other factors contribute to the incidence of the disease which in 1921 and 1923 assumed an epidemic character. Failure of the crop and the consequent consumption of large quantities of spoiled or mouldy rice may have been responsible for the 1921 outbreak. It is pointed out that the rice workers live in insanitary houses and have to work for many hours in cold and muddy water.

The onset of the disease is insidious, slowly progressing, and if no change is made in the diet the patient dies of heart failure or some

intercurrent infection. If foods containing vitamin B are given, slow recovery takes place.

'Maladie des jambes' is characterized by three groups of symptoms: (1) Cardiac manifestations, palpitation, tachycardia, oedema and dyspnoea. (2) Neurotic phenomena—weakness of the legs, pain in the calf muscles, and paraesthesiae. (3) Occasionally slight gastro-intestinal symptoms, but all cases complained of pain on pressure over the epigastrium. The authors have come to the conclusion that 'maladie des jambes' is identical with beriberi.

An outbreak of disease in the Parish Prison in 1927 is referred to, but as particulars of the diets were obtained from the prisoners themselves and the authors do not appear to be certain that the condition was beriberi at all, no further mention of this need be made.

A. D. B.

BANERJI (R. N.). **An Outbreak of the Epidemic Dropsy Type of Beriberi in Allahabad, 1927.**—*Indian Med. Gaz.* 1928. Apr. Vol. 63. No. 4. pp. 190–192. With 1 plan.

The epidemic here described started in Allahabad about the middle of January, 1927, reaching a maximum in February and March and gradually disappearing by the end of April. 100 Bengalee families out of a total of 500 families were attacked, nearly 200 cases in all. The sufferers were almost all Bengalese, the age incidence was between four and sixty years, the ratio of females to males was 3 to 1 and breast-fed babies escaped entirely.

Clinically the findings were as follows:—onset with gastro-intestinal symptoms; remittent or intermittent fever of moderate severity; oedema, mostly of legs and feet; no true neuritis; some cardiac signs, such as dyspnoea. The average duration was about six weeks and there were only a few deaths, all among females.

It is remarkable that the outbreak was practically confined to the Bengalese, and the cause of the condition, therefore, is to be sought in factors relating to this class of the community in particular. Their diet consists of rice, fish and vegetables, cooked in mustard oil, fresh fruits, etc. Apparently the rice was not clearly to blame, though it was imported and some of the shops where it was sold were insanitary. Again, several members of a family were affected one after another, even when rice had been prohibited, and three families were attacked which had stopped taking rice a month before they began the disease. The mustard oil was bazaar-made and was found to be adulterated. This was a possible cause of the outbreak, since those who used pure mustard oil escaped, while in five families the stopping of mustard oil, rice being continued, led to recovery.

The author does not wish definitely to implicate any particular factor as the cause of the outbreak, but he is certain that neither epidemic dropsy nor beriberi is due to avitaminosis. The disease is not transmissable from person to person. It is thought that races like the Bengalese, who are accustomed to carbohydrate excess for generations, are more likely to fall victims to the disease. In this connexion it is interesting to note that the up-country Muhammadans, who take very little carbohydrate, escape entirely.

A. D. B.

ALBERT (Jose) & OCAMPO (Albino N.). **Is Infantile Beriberi disappearing? Facts on Infantile Beriberi during the Last Thirteen Years.**—*Jl. Philippine Islands Med. Assoc.* 1928. May. Vol. 8. No. 5. pp. 221–225. [College of Med., Univ. of the Philippines.]

This work is based upon 422 cases of infantile beriberi admitted to the Department of Pediatrics of the Philippine General Hospital, Manila, during the years 1915–1927.

The following facts were elicited:—Sex has no influence in the condition, the proportion being 1·15 to 1 in favour of males. There are three types of the disease. 1. The *cardialgic type* in which evidence of precordial pain, circulatory failure, cyanosis of the extremities and lips is noted. 2. The *aphonic type* characterized by aphonia with catarrh of the upper respiratory tract. 3. The *pseudo-meningitic type* in which ptosis, with or without staring of the eyes, choreic movements of the hands, restlessness and even convulsions occur. The first and second type are almost always found in infants of one to three months and the third type is noted after the third month and nearly always between six and nine months. The first two types predominate.

Infantile beriberi is certainly decreasing in Manila. In 1915 the figure was 7·79 per cent. of admissions, while in 1927 it had fallen to 0·45 per cent. The deaths have fallen from 739 cases in 1923 to 262 in 1927 (up to November). These good results are due to the efforts of the Public Health Service and to the appropriation of funds for supplying "tikitiki" on a large scale to the poor.

A. D. B.

BRAY (George W.). **Vitamin-B Deficiency in Infants: its Possibility, Prevalence and Prophylaxis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. June 30. Vol. 22. No. 1. pp. 9–36. With 9 text figs., 1 map & 2 plates. [Summary appears also in *Bulletin of Hygiene.*]

The author has shown in a very decided manner that a large part of the infantile mortality in the island of Nauru (a mandated territory in the Pacific) is due to a vitamin B deficiency. This mortality is high and the deaths are classed under many different headings owing to the variety and rapidity of the symptoms. The introduction of European foods, together with the abolition of the use of fermented "toddy" (the sweet sap of a coco-nut spathe), led to this vitamin lack. The age incidence of this deficiency disease is practically confined to the 3rd month; the duration is from 5 min. to 12 hr. from onset to death. If the infant is saturated with vitamin B (in the form of marmite, rice polishings, "toddy," "lactogen," etc.) the child recovers in a few hours. Acute and chronic cases occur which are always seen in breast-fed infants and an insidious type in older artificially fed babies. In the acute cases there are three well-defined phases: (1) gastro-enteritic, (2) pneumonic, (3) meningismic. The insidious form is characterized by a marked lowering of resistance to infection. Analyses of the mother's milk showed, amongst other deficiencies, a low fat content, though a large amount of fat was consumed in the form of coconut. If the mother's diet were supplemented by a source of vitamin B the fat content of the milk rose enormously. Prophylaxis consisted of the administration of an emulsion of the yeast from "toddy" (a very potent source of vitamin B) and an equal amount of cod-liver oil, to all mothers and children, who were compelled to attend weekly at the clinics. At the same time large quantities of fresh "toddy" were

given to both mother and child. The effect was remarkable, with a large drop in infantile mortality, a great increase in the average gain in weight, and a large decline in infantile hospital admissions, for it is very rare for a baby receiving the emulsion to develop any infective process. Cases which had previously not done well on cod-liver oil alone improved greatly when the "toddy" yeast was added. It is suggested that vitamins A and B have a synergic action, so that one should look for a vitamin B deficiency when administration of A is not having any marked effect. Marasmus, for instance, in the author's experience, always responds to the administration of both factors. The clinical findings also made it clear that a B-factor deficiency does occur in human milk, even without the mother showing any deficiency symptoms.

H. N. H. Green.

MEBIUS (J.). Oedeemtheorie de beri-beri. [**The Oedema Theory of Beriberi.**]—*Nederl. Tijdschr. v. Geneesk.* 1928. Aug. 18. 72nd Year. 2nd Half. No. 33. pp. 3985–3997. [Refs. in footnotes.]

Mebius quotes the post-mortem reports of three male sufferers from beriberi, paying special attention to the condition of the heart and giving details of the microscopical examination of this organ. Fatty degeneration of the heart muscle, if present at all, is never marked and cannot account for the cardiac failure. The slight intercellular oedema, found in the right heart, but absent in the left, is caused neither by inflammation nor back pressure, nor is it of renal or cachectic origin. It is to be considered as a symptom of the avitaminosis as such. More marked yet is the intracellular oedema of the muscle fibres, which is apparent from the unusually distinct longitudinal striation, whilst the transversal striation becomes very indistinct. This serous imbibition of the muscular tissue is the cause of the failure of the beriberi heart (see AALSMEER and WENKEBACH, below). It is not necessary to consider this condition as a sequel of a primary lesion of the heart nerves: (1) There is no anatomo-pathological proof for such a sequence, (2) the motor nerves have seldom been found affected, (3) the neuritis of vasomotor nerves as the cause of oedema is only hypothetical, (4) the fairly constant tenderness of the muscles without tenderness of the nerve trunks, is against the existence of neuritis and (5) so is the irregular and varying character of the hypaesthesia, which very seldom increases to anaesthesia.

The blood in beriberi is less coagulable than normal; the subcutaneous and subperitoneal oedema, as well as the oedema of the muscles is in discordancy with the moderate oedema of liver, spleen and kidneys. The different contractility of the capillaries of various organs can explain this, according to the author. Avitaminosis in beriberi causes a general alteration of the colloidal condition of all contractile tissues.

Finally the author puts the question, whether this theory accounts for the symptoms in beriberi and gives an affirmative answer to this question, considering respectively heart failure, muscular weakness, paralysis of the diaphragm, constipation, oedema, ascites, hydrothorax, hydropericardium.

The sensory disturbances may be caused by the oedematous alteration of the skin, involving also the tactile terminal organs of the nerves; the low tendon reflexes are caused more by the impossibility

of contraction of the muscles than by actual neuritis, whilst the tenderness of the muscles is not in contradiction with the still intact condition of the sensory nerves of the muscular tissue. W. J. Bais.

AALSMEER (W. C.) & WENCKEBACH (K. F.). Het beri-beri-hart. I. Clinisch Gedeelte. II. Proeve eener verklaring der ziekteverschijnselen aan hart en bloedsomloop van beri-berilijders. [**The Beriberi Heart. Clinical Account.**]—*Nederl. Tijdschr. v. Geneesk.* 1928. May 12. 72nd Year. 1st Half. No. 19. pp. 2340–2371. With 7 figs. on 1 plate. [7 refs.] [Netherlands-Indies Med. School, Soerabaya.]

The first of these articles is more especially written by Aalsmeer. The heart symptoms in beriberi are generally put down to vagus degeneration. Yet, though such degeneration may occur in beriberi, the absence in this disease of arhythmia, so common a sequel of vagus lesion, made others ascribe the heart symptoms to a direct noxious influence of beriberi on the heart muscles. In discordance with a myocardial affection, however, is the preponderance of the hypertrophy on the right half of the heart. It becomes more and more probable that the whole of the circulatory system is affected in beriberi.

The beriberi heart is an "irritable heart", but at the same time often shows signs of cardiac weakness (back pressure, dyspnoea). The vessel wall is hypotonic, which is shown by the lowered diastolic blood pressure. The combination of symptoms has some likeness with sympathicotony, but in convalescence vagotony may occur. These facts do not lead to a well-defined conception of the pathogeny of the beriberi heart.

The author gives an elaborate and interesting account of his observations. In the lightest cases the heart symptoms remain slight or even unnoticed, because the disturbance of the motor and sensory nerves urges the patient to take rest. Yet in such cases they are never missing and become more marked after slight exercise. The heart region shows a sort of waving pulsation, which the author calls "turbulence." Sometimes there is a slight enlargement to the right and the heart sounds are louder than usual, but there are no murmurs. In more serious cases the patients complain of a sensation of heaviness or even pain in the liver region, the "turbulence" of the heart is more pronounced, but there is no distinct apex beat. The heart is now enlarged to the right, but also slightly to the left. Systolic murmurs may be heard. The electrocardiogram is normal. The lungs are never affected to any extent, which is in striking contrast with what we usually see in cardiac patients. The radiographic examination neither shows the intensified shadows in the lower parts of the lungs nor round the hilus so commonly seen in other types of cardiac incompetence, but invariably enlargement of the liver is seen. The most serious (acute, pernicious) type of beriberi ("Shoshin" of the Japanese), dramatically pictured by various authors, e.g. by MANSON, is not accompanied by pulmonary oedema. The peripheral circulation fails, the heart is much enlarged and so is the liver, as a symptom of important back pressure. A venesection may bring much comfort to the patient in this serious and often fatal condition.

Anatomo-pathological examination shows a dilatation of the heart and a thickening of the muscular wall of both ventricles, without any peculiar finding in the microscopical picture.

As regards the treatment, cardiac tonics and diuretics have no effect at all, whilst the administration of vitamin B, apart from its anti-neuritic action, has a striking diuretic effect in the hydropic beriberi patient.

Taking all these facts into the account, in the clinical picture of beriberi the failure of the right heart predominates, whilst no reason therefor can be found in the pulmonary circulation.

W. J. Bais.

WENCKEBACH (K. F.). **St. Cyres Lecture on Heart and Circulation in a Tropical Avitaminosis (Beri-Beri).**—*Lancet.* 1928. Aug. 11. pp. 265–268. [3 refs.] [First Med. Clinic, Vienna.]

The lecturer recounts how forty years ago he was intimately acquainted with PEKELHARING and WINKLER, who had studied beriberi in the Dutch Indies. Many of the findings aroused his interest so much that seven years ago he succeeded in persuading Dr. AALSMEER, working in Java, to undertake a research upon the disease, more especially in its cardiac aspects. The present lecture is based upon the findings thus obtained.

Proof of the vitamin B pathogenesis of the disease is furnished by the fact that beriberi occurs where polished rice is the exclusive diet and by the fact that the sole effective treatment is the addition of rice bran, rice extracts, or the bean *Phaseolus radiatus* to the diet.

The following cardiac manifestations are noted :—

1. From the beginning the right heart is enlarged as are also the left auricle and ventricle. This was confirmed radiologically.
2. There is a rapid increase in the size of the heart with cardiac failure, chiefly involving the right side. A curious " wriggling, fluttering " apex is evidence of this.
3. Increasing stasis in the liver and venae cavae with hepatic enlargement, ascites and even sudden death.
4. There is never any clinical or electrocardiographic evidence of cardiac irregularity. The E.C.G. may show right ventricle preponderance.
5. The pulmonary circulation shows no stasis.
6. All the usual cardiac tonics are of no avail in treating the beriberi heart, vitamin B being the only remedy.
7. At autopsy there are no inflammatory changes in the cardiac muscle.

As regards the cardiac physics of the condition, the following arguments are brought forward. If the two ventricles show an increasing and equal failure in systolic contraction, both will be unable to empty themselves completely at each systole and the residual blood added to the amount arriving for the next systole will soon bring about cardiac failure. Two factors, however, establish a difference between the right and left side of the heart. Firstly, the right side has a weaker musculature and the tricuspid valves, having no adequate fibrous support, are very liable to become incompetent. Secondly, since the right heart receives all the blood from the periphery and since the left heart can only receive that blood sent to it by the right heart, it follows that the more engorged and ineffective the right side becomes the safer becomes the left. These contentions, in the author's opinion, account for the rapidly increasing failure of the right heart in acute beriberi, with visceral engorgement, while just up to the last few moments before death the lungs are free, the left ventricle poorly filled and the pulse

small and rapid. The following law is formulated, "in equal and increasing feebleness of the whole heart muscle the patient suffers most and dies from the failure of the right side of the heart only."

An attempt is made to explain the cardiac enlargement met with in beriberi. The vagal factor is discussed and found unacceptable. Hypertrophy cannot account for the increase in size and weight of the organ since there is no reason why this should occur according to the arguments already given. The explanation favoured is that of a water retention with consequent swelling of the cardiac muscle fibres. The following facts are brought forward in support of this hypothesis. (1) TIEMANN has shown that striated muscle, in contrast with the smooth variety, swells in water. This is true of heart muscle but to a less extent. In beriberi a pseudo-hypertrophic-like swelling of the muscles has been noted in the preoedematous stage. The giving of vitamin B causes these enlargements of the calf muscles to "melt away as snow in the sun" and at the same time the heart rapidly becomes normal in size and in contractility. (2) This marked improvement is accompanied by a great increase in urine output. (3) Experiments show that the muscles are one of the biggest water reservoirs in the body. (4) The E.C.G. in the beriberi heart shows an increased conductivity which becomes more marked as cardiac failure advances. A similar phenomenon was found experimentally in the water swollen heart.

It is suggested that water retention may be the cause of other beriberi signs such as swelling of the motor and sensory nerve endings, anasarca, swelling of the parotids and of the mucous membrane of the gall bladder. Other diseases may show a similar condition as in the water retention of myxoedema.

Heart "hormones" and "automatins" are considered and it is suggested that vitamin B, in its chemically pure state possibly identical with histamin, may belong to this group of substances. There is a possibility that other chemical agents will be found to stimulate the heart even when a systole has already occurred, for "the beriberi heart shows that not every heart that stops its systolic action has lost its regular automatic vital function."

A. D. B.

SUTHERLAND (G. A.). **The Heart and Circulation in Beri-Beri.** [Correspondence.]—*Lancet.* 1928. Aug. 18. pp. 358–359.

The writer of this letter takes exception to Professor WENCKEBACH'S views (see above) regarding cardiac physics. The great function of the right ventricle is to carry on the pulmonary circulation. In beriberi there is no pulmonary stasis and therefore the right heart should be regarded as working efficiently. How can such a well acting right heart be responsible for the visceral engorgement? In the commonly accepted view this engorgement is due to a failure of the "forward pressure" of the left ventricle and indeed all the cardiac signs in beriberi are due to left ventricle weakness, the right side only beginning to fail at the very end as evidenced by the onset of pulmonary stasis.

Professor WENCKEBACH'S explanations are characterized as an example of the "back pressure theory in all its nakedness." The need for physiological experiments to show the correlation between the two sides of the heart, after the manner of HARVEY, is suggested.

A. D. B.

STEPHENS (G. Arbour). **The Heart and Circulation in Beri-Beri.** [Correspondence.]—*Lancet.* 1928. Sept. 1. p. 478.

A communication regarding Professor WENCKEBACH's paper, it deals more especially with Dr. SUTHERLAND's letter (above). Reference is made to a paper by the writer in the *Dublin Journal of Medical Science* in October, 1916, in which he suggested that a negative pericardial pressure exists in healthy subjects and that this disappears in disease, especially when serous effusions are present. This negative pressure keeps the pericardial fluid at a uniform thickness all over the cardiac surface and its removal affects the weaker walled right ventricle sooner than the left. These findings are expressed in a mathematical formula which the writer suggests may possibly be of help to Professor WENCKEBACH in his law of circulatory correlation between the right and left heart.

A. D. B.

ACOSTA-SISON (H.). **Neuritis in Filipino Parturients.**—*Jl. Philippine Islands Med. Assoc.* 1928. May. Vol. 8. No. 5. pp. 230–234. With 3 charts in text. [College of Med., Univ. of the Philippines.]

Neuritic symptoms are very common among Filipino parturients. Local physicians hold the opinion that the condition is beriberi and that babies of mothers so affected, especially when breast-fed, invariably succumb to infantile beriberi.

The condition is characterized by various paraesthesiae, present usually in the legs, sometimes in the arms and rarely over the whole body. Oedema may or may not be present. The last two months of pregnancy is the most usual time for the occurrence of the malady and in mild cases symptoms disappear almost immediately after parturition. In more severe cases the numbness and weakness of the extremities do not disappear until two to three months after parturition. In the extreme grade of the disease, *i.e.* those showing muscular wasting and foot drop, recovery takes five months or more.

Three hundred and twenty-seven cases of "numbness" were analysed as regards aetiology. Seven only showed heart affections. A long list of associated and possibly causal conditions is given. Apparently out of nine very severe cases, eight showed one of the following complications—dysentery, typhoid, post-partum haemorrhage, puerperal infection, pernicious vomiting of pregnancy.

As regards diet no differences were found between the food of sufferers and non-sufferers. Semi-polished rice, fish and vegetables form the main part of the diet. Meat was consumed liberally by some and sparingly by others. Milk and eggs were not taken freely.

The author is inclined to the view that the condition is a toxaemia of pregnancy. True beriberi cases as seen in the Philippine General Hospital tend to be immune after one attack, but in the malady under discussion the symptoms tend to recur in successive pregnancies. In this connexion, too, it is interesting to note that, like eclampsia, the neuritis is by far the most frequent in primiparae. The possibility of pressure on pelvic nerves is mentioned as a possible causal factor.

The relation between infant mortality and neuritis in the mother is discussed. In 1917, of 137 babies whose mothers had no neuritic systems, 32 per cent. died within one year. In 1924 out of 189 babies

the figure was 31 per cent. These findings are to be contrasted with the following :—In 1917, out of 251 breast-fed babies of neuritic mothers, 49 per cent. died in the first year, and in 1924, out of 243, the mortality was 36 per cent.

The author points out that breast-fed babies of healthy mothers die of beriberi, and conversely mothers who have beriberi, even without treatment, may rear healthy children. He agrees that beriberi does exist both in mothers and babies, but to say that all neuritic symptoms among parturients are of beriberic origin is " far from true."

A. D. B.

JANTZEN (Walter). **Beri-Beri-like Polyneuritis—Case Reports.**—*Sixteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1927. pp. 172–176. [Truxillo Railroad Co. Hosp., Puerto Castilla, Honduras.]

Five cases of polyneuritis occurring at Truxillo Railway Company Hospital, Honduras, are described in detail. The condition is rare in this particular locality, these being probably the only cases recorded since the opening of the hospital nine years ago.

Of the five cases, four were males and one female ; four were natives of Honduras and one a Jamaican negro. Only one case ended fatally. The signs were those of a peripheral neuritis, most marked in the legs, with absent or diminished deep reflexes and normal organic reflexes. Two of the cases showed involvement of the upper limbs and in these the fifth and seventh cranial nerves were also affected. The vagus and phrenic nerves were involved in two cases. Cardiac dilatation was encountered twice and in the one fatal case, in addition to the dilatation, hydropericardium was found at autopsy. There was no oedema in any of the cases. The spinal fluid was negative in all and no gross lesion in the nervous system was found at the one autopsy.

The possibility of beriberi is discussed. Against this diagnosis are the facts that the cases came from various farms fairly widely separated and that the diet contained articles rich in vitamin B. There were none of the signs associated with such poisons as arsenic, lead or alcohol. Had the cause been an infection more cases would have been expected. It is suggested that the condition might possibly be that known as acute febrile polyneuritis.

A. D. B.

OSHIRO (M.) & YUSHYO-KEI. **On Complications in Beri-Beri Cases.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1928. June. No. 279. English summary p. 44. [In Japanese.] [Govt. Hosp., Karenko, Formosa.]

A study was made of the complications occurring in beriberi cases admitted to the Government Hospital at Karenko, Formosa, during the year 1927. Malaria, hookworm disease and ascariasis were found in almost all of the cases and it is suggested that they may play a part in the etiology of the disease.

Other complications noted were " gastritis, tuberculosis, pleuritis, typhoid fever, pyelitis, bronchitis, hyperacidity, syphilis, asthma, neuralgia."

A. D. B.

DE VOGEL (W.). Préparations anti-béribériques de vitamine. [**Anti-Beriberi Vitamin Preparations.**]—*Bull. Office Internat. d'Hyg. Publique.* 1928. May. Vol. 20. No. 5. pp. 735–737.

The Laboratory of Public Health, Dutch Indies, has placed before the public four preparations for the prevention and cure of beriberi.

1. *Tablets of anti-beriberi vitamin.* These consist of kaolin, which has absorbed the vitamin contained in rice husk. One tablet (0·250 gm.) contains the vitamin extracted from 7·5 gm. of rice husk. One to three tablets per diem are sufficient to protect against beriberi in an adult who eats completely decorticated rice. When accessory articles of diet are taken 1, 2 or 3 tablets should be given according to the nature of the accessory foods. For cases already showing signs of the disease 8–12 tablets per diem are necessary, especially at the beginning.

2. *Extract of anti-beriberi vitamin.* A liquid obtained by the extraction of activated "acid clay" is concentrated so that 0·1 cc. contains the vitamin of 15 gm. of rice husk (0·1 cc. equals two tablets). A daily dose of about 1–10 cc. will be sufficient for a adult living on polished rice.

Diluted with water this extract can be mixed with cooked rice, or it can be added to the water in which the rice is to be cooked. The extract itself is stable, but when diluted with water it should be used immediately. If for any reason a watery solution is desired to be kept, the extract may be diluted with a solution of 250 milligrammes of benzoic acid in a litre of water.

3. *Anti-beriberi vitamin powder.* This is made from the same substance as the tablets. It can be mixed with the rice before or after cooking, without altering the taste.

4. *Ampoules* (2 cc.) Each ampoule contains 1 mgm. of vitamin, the daily dose of an adult, mixed with 3 mgm. of harmless material and normal saline. The injection method (apparently subcutaneous or intravenous) is to be used in acute cases.

For the use of the Public Health Service these preparations are distributed free of cost. One of the first two preparations will be placed in the hands of an industrial concern.

A. D. B.

WOOLLARD (H. H.). **The Nature of the Structural Changes in Nerve Endings in Starvation and in Beri-Beri.**—*Jl. of Anatomy.* 1927. Apr. Vol. 61. Pt. 3. pp. 283–297. With 10 text figs. [10 refs.] [Univ. College, London.]

Most observers are of the opinion that inanition alone does not produce beriberi. In birds this may not be the case, as similar changes in the nervous system have been stated to occur in both conditions. As regards the neuro-pathological findings in these conditions, no uniformity is met with, some workers finding a general involvement of the nervous system, others a lesion in the anterior cornual cells of the cord and others again a peripheral neuritis. The object of this work is to determine, if possible, the point at which degeneration in the nervous system begins.

Rats were used throughout the experiments. Three series of animals were employed. 1. Those which had been fed on a deficiency diet and had developed beriberi. The diet consisted of :—caseinogen

20 parts, rice starch 65 parts, salt mixture 5 parts, cod liver oil 2 parts, hardened oil 10 parts. 2. Those deprived of all food for 4–7 days, but allowed to drink at will. 3. Similar to the second group, but here the animals had been allowed to nibble yeast extract at will.

As regards the beriberi animals, careful investigations revealed no changes in the cord, brain, nerve trunks or sympathetic nervous system. The intermuscular medullated sensory and motor nerves and their endings when stained with gold, silver and methylene blue methods, revealed definite morbid changes. In some cases the nerve endings had disappeared, but more usually they were swollen and showed loss of finer differentiation. The myelin suffered more than the axis cylinder and the changes were more marked near the ending of the nerve, becoming rapidly less as it leaves the muscle.

Rats taking no food showed similar changes in the nerve endings, but to a less degree. The animals allowed to nibble yeast extract presented the same lesion but possibly to a slighter extent than in the former group.

Both the deficiency fed and the starved animals revealed an abundance of chromaffin substance in the suprarenals and the cortex of these organs was unaffected.

A. D. B.

TRABAUD. Le test d'Aldrich et de Mac-Clure dans le béribéri. [**The Test of Aldrich and Maclure in Beriberi.**]—*Rev. Méd. et Hyg. Trop.* 1928. May–June. Vol. 20. No. 3. pp. 80–82.

The Aldrich and MacClure test which has been studied in many conditions, is here applied to beriberi. 0·2 cc. of 0·8 per cent. NaCl solution injected into the skin produces a small elevation, white in colour, on which the pores of the skin are clearly visible. This bleb in the normal subject is absorbed in from 50 to 90 minutes. This absorption time is notably shortened in " hydropigenous " conditions, e.g. 5–15 mins. in a case of cirrhosis of the liver and ascites with oedema of the legs, 35 mins. in a " mixed " nephritis case and 15 mins. in a case of cardiac dropsy (AZERAD). The figure is also reduced in cases in which there is usually no oedema, e.g. fever, infantile cholera, pregnancy and certain mental conditions.

The Aldrich MacClure test demonstrates the " tissue factor " in the production of oedema and the avidity with which oedematous tissues absorb saline.

In beriberi cases the following results were obtained :—Injections were made into the skin of the arm and leg and it was noted that the bleb was absorbed in 5–6 minutes. The patients were then placed upon a diet rich in vitamin and treated with large doses of theobromin. The oedema rapidly diminished and at the end of ten days the bleb disappearance time had increased to 27–30 mins. in the arm and 21–23 mins. in the leg. Twenty days later, all swelling of the arms having disappeared, the absorption test showed 50–70 mins. in the arm and 20–25 mins. in the legs.

The author draws the following conclusions :—The " tissue factor " plays a great part in beriberi as in other oedematous conditions. The factor is especially evident in wet beriberi where the hydrophil power of the tissues is at a maximum and the bleb is absorbed in about six minutes in the arms and legs. The absorption rate may therefore be a useful guide in prognosis. It would appear that the absorption rate

is greater in beriberi than in renal disease and therefore may be useful in differential diagnosis. When the oedema of beriberi has disappeared, or before it has appeared, the test may still be given and indicates that a hydropigenous state is present.

A. D. B.

McCarrison (R.). **Beri-Beri Columbarum. With a Statistical Examination of Experimental Data (Appendix A)** by Sundararajan (E. R.) **and an Account of the Aerobic Spore-forming Bacilli in Rice (Appendix B)** by Gloster (T. H.).—*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1928. Mar. Memoir No. 10. 146 pp. With 33 figs. (18 on 7 plates).

Clinically beriberi may be defined as a symptom complex of multiple neuritis, cardiac derangement and oedema. Pathologically it shows degenerative changes in the whole nervous system ; degeneration of the muscles ; cardiac hypertrophy and dilatation, most marked on the right side and associated with fatty degeneration ; oedema and serous effusions ; passive congestion of the abdominal viscera, with ecchymoses in the mucosa of the stomach and duodenum and enlargement of the suprarenals.

The objects of this investigation are three in number.

(1) To discover whether a condition, as above defined, can be produced in animals by means of a diet of which rice was the staple factor.

(2) To discover whether beriberi-producing rices acted through their contained toxic substances or through vitamin deficiency.

(3) To determine how far true beriberi in animals resembles the human form.

The pigeon was chosen as the experimental animal, 1,872 birds being used in the investigation. Rats were used only for subsidiary purposes.

Polyneuritis columbarum is first discussed. This condition occurs in birds fed exclusively on polished rice and can be prevented by the addition of rice polishings and sometimes cured by the administration of this or other vitamin B material. Clinically the birds show loss of appetite, wasting, subnormal temperature, slow respiration, asthenia, and intestinal and nervous symptoms. Pathologically very detailed methods are given for differentiating this condition from human beriberi. One of the chief differences is that in the former condition the heart is diminished in size.

It is impossible to distinguish clinically between beriberi columbarum and polyneuritis columbarum. Pathologically beriberi columbarum resembles the definition of the human form given above. The following diagnostic criteria are given—when in addition to nervous lesions, cardiac enlargement and degeneration, oedema or serous effusions, muscular degeneration, and passive congestion of the viscera are found in polyneuritic birds, a diagnosis of true beriberi of the wet variety can be made. In the presence of all the above, with the exception of oedema, the dry variety of beriberi can be diagnosed. When the heart is of normal size, yet obviously degenerated, an intermediate form is present, but when the heart is smaller than normal, even though degenerated, the diagnosis is polyneuritis columbarum.

Detailed observations were made regarding the heart both in normal and in deficiently fed pigeons. Careful descriptions are given for distinguishing the cardiac appearances in the various conditions.

A long discussion follows of diets and the effect of adverse conditions upon rice. The possible toxicity of rice receives full consideration as do many factors influencing the birds themselves.

As a result of this section of the work the following conclusions may be drawn.—Beriberi columbarum can be produced in pigeons by feeding them with diets which produce the disease in man. It exactly resembles the human disease in its pathology. The chief factor in the production of the avian form is insufficiency, but not absence, of vitamin B, the most likely diet to produce the disease being one in which the vitamin B value is from 20–50 per cent. lower than the minimum required for normal metabolism. Diets of greater vitamin deficiency are less likely to cause the disease. A toxic agent is produced during metabolism disordered by insufficiency of vitamin B, and this agent is the cause, either wholly or in part, of the clinical and pathological signs of the disease. Certain diets appear to give rise to this agent especially, viz. polished rice to which insufficient amounts of dhal or of ragi were added.

Apparently toxic substances in rice itself are not responsible for the disease. It was found that beriberi is precipitated by cold and damp and that the incubation period in pigeons is from 20 to 110 days.

It is suggested that there are beriberi-like maladies due to dietetic or infectious causes, but the variety met with in the Madras Presidency is believed to be dietetic in origin. Diets associated with the human disease in this area and in Burma are discussed, together with its experimental prevention.

Appendix A of the paper deals with a statistical examination of the experimental data relating to the heart. The author of this section is E. R. Sundararajan.

[Appendix A is a statistical analysis of the heart weights and body weights of 552 deficiently-fed and 348 control pigeons. It is concluded that the general effect of the deficient diets was to cause atrophy of the heart, but where the deficient diet was other than milled rice 25 per cent. of hearts were hypertrophied, indicating "the existence of a specific factor which counteracts the general tendency of the diets to cause cardiac atrophy." J. F. C. H.]

In Appendix B Lt.-Col. T. H. Gloster discusses the aerobic spore-forming bacilli in rice. A full account of the various methods is given, and the following conclusions are drawn :—The aerobic spore-forming bacilli found in the rices examined were those usually present in canned and other foods. There is no reason to suspect that these organisms form beriberi-producing toxins. Rice associated with human beriberi was not found to contain such bacilli in the interior of a large proportion of the grains and the distribution of these organisms in rice does not suggest that they have a causal relation to the disease. Thirty-five types of bacilli prevalent in Indian and Burmese rice were isolated and described.

A. D. B.

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## PELLAGRA.

GOLDBERGER (Joseph). **Pellagra: its Nature and Prevention.**—*Public Health Rep.* 1927. Sept. 2. Vol. 42. No. 35. pp. 2193–2200.

An attempt is made to answer some of the questions generally asked by the lay public with regard to pellagra. A very careful description of the dermatitis and its usual sites is given. Stress is laid upon suspicious symptoms which may appear before the rash, viz. loss of strength, indigestion and nervousness appearing or made worse in the late winter and early spring; vertigo, epigastric pain, headache, insomnia and constipation. These symptoms, even in the absence of soreness of the tongue, burning of the hands or feet and diarrhoea, are suggestive when occurring in an individual who is a poor eater or in one who has lived upon a deficient diet. There is no ground for worry if milk and meat have been taken habitually in sufficient quantities.

Proper treatment will lessen the mortality of the disease. "It is probable that in each year for every death attributed to the disease there are fully 20 persons with clearly recognisable attacks and probably as many more with debility from the same cause but not definitely marked as such."

The prevalence of pellagra in the Southern States of America and its relation to food production and the cost of living is discussed. Etiological factors are fully described and the impossibility of contagion and the importance of balanced diet are stressed. Careful instructions are given for treatment on dietary lines together with suggestions for the avoidance of recurrences.

A. D. Bigland.

BLOOM (Charles James). **Pellagra in Infancy and Childhood in the United States.**—*Southern Med. Jl.* 1928. Feb. Vol. 21. No. 2. pp. 124–136.

The paper opens with a historical survey of pellagra in general and an account is given of the various aetiological theories. Tables are presented showing the morbidity and mortality rates of the disease in the various states of North America.

Pellagra in childhood apparently has not received the study which it deserves; in fact the author carefully examined 168 pediatric text books and found that only twenty-two made any mention of the disease at all. The series of cases here discussed comprises 163, most of which were studied in the Charity Hospital, New Orleans.

The number of cases recorded in infants under six months of age is small, the greatest incidence occurring between two and ten years. This is in agreement with the findings of the Thompson-McFadden Commission in its second progress report. The presence of congenital pellagra has not yet been proved in America though the author states that in Europe it is almost an accepted fact that there is a "profound tendency" for the disease to be transmitted from parent to child. The mortality rate is about 15 per cent. of the total cases in children.

As regards incidence, approximately 10 per cent. of the cases are under 15 years and in infancy the small number is probably accounted for by failure to diagnose them. Such children may die from "diarrhoea" before the rash appears. Except about the pubescent period, when females are slightly more frequently attacked than males, sex

plays no part. The same may be said of the race factor, with the exception that the disease does not occur among Jews.

The symptoms are discussed under the usual three headings and are apparently much the same as those encountered in the adult. A fourth heading, the osseous system, is also considered and this is of particular interest. In a review of the literature the author states that no mention is made of the association of the osseous system with pellagra. It was found that a large percentage of pellagrous children had symptoms referable to the joints and long bones. These varied from pain on manipulation to a type of arthritis resembling that found in Still's disease. Dactylitis was observed in three cases.

A. D. B.

CRUTCHFIELD (Earl D.). **Pellagra, with Special Reference to the Skin and Mucous Membrane.**—*Arch. Dermat. & Syph.* 1928. May. Vol. 17. No. 5. pp. 650–657. [11 refs.] [Dept. of Derm. & Syph., Univ. Texas, Galveston.]

Pellagra, like most endemic diseases, tends to show clinical alterations as it adapts itself to its environment or becomes milder. This study, founded upon 125 cases of pellagra in the John Sealy Hospital, Galveston, was undertaken chiefly to analyse these changes, especially as regards the condition of the skin and mucous membranes.

The actual number of cases here reviewed is 109, since 16 of the original series did not present the classical signs and were therefore excluded. The following statistics were collected :—46·4 per cent. were negroes and 74·6 per cent. were females, many being housewives or cooks, 80·7 per cent. were city dwellers and the others came from small towns or lived in the country. 53·47 per cent. had an adequate food supply available. Twelve lived on carbohydrates with meat, and twelve presented disease conditions preventing proper nourishment. Only 18·17 per cent. came from areas not having modern sanitation and in one instance other pellagrins were found in the family. 82 of the 109 cases were seen in their first attack. 48·43 per cent. had diarrhoea. 85 per cent. showed some pathological condition which might be considered contributory. Removal of a focus of absorption in 8 per cent. caused a disappearance of the skin manifestations, suggesting that the lesion may be a toxic dermatitis.

Clinico-pathological study revealed the following :—15·13 per cent. gave a positive Wassermann reaction, or showed clinical evidence of syphilis. A secondary type of anaemia was present in 73·63 per cent. There was a slight lymphocytosis in most of the cases with absolute leucocytosis in 37·53 per cent. 17·15 per cent. showed marked leucopenia. The blood pressure was uniformly low and 42 patients had subnormal temperatures. 23·2 per cent. had slight albuminuria. Of 18 per cent. which had gastric analyses, 60 per cent. revealed a hypo-acidity. In 9 per cent. the spinal fluid was examined and only 2 showed an increase of cells or globulin. The stools revealed no higher percentage of parasites than was found in other patients.

A study of the mucous membranes showed 64·57 per cent. with lesions in this situation. Glossitis was the most common. Stomatitis occurred in 21·27 per cent., gingivitis in 16·14 per cent., vulvo-vaginitis in 12·1 per cent., and proctitis in 10·09 per cent. The author is of the opinion that such lesions are as important in the diagnosis as the skin manifestations.

A full account of the skin changes is given. 78·79 per cent. presented such lesions. The chief conclusions to be noted under this heading are that trauma plays a more important part in their production than photodynamic action and that the skin lesions in pellagra are becoming milder and more atypical.

"The treatment in all cases was a balanced diet with a high protein intake. 64 patients improved; 8 recovered without subsequent attacks and 19 died, a mortality of 20 per cent."

Ten cases came to autopsy. Neither the skin nor mucous membranes presented specific changes pathognomonic of pellagra. There was a marked thinning of the mucosa, especially that of the proximal portions of the small intestines. The only other constant change was fatty degeneration of the liver.

A. D. B.

GARRISON (C. W.). **Economic Aspects of Pellagra.**—*Southern Med. Jl.* 1928. Mar. Vol. 21. No. 3. pp. 237–238.

The author pleads for fuller economic recognition of pellagra on account of its increasing prevalence, especially in Arkansas. It is impossible, owing to faulty statistics, to arrive at an accurate morbidity figure, but "when an insidious, lingering disease reaches the proportions of 5,000 to 10,000 cases with approximately 500 deaths per annum in a population of 1,800,000, it should become a live issue not confined to the economist and statistician, but for the commonwealth."

Efforts should be directed to the matter of food production and supply. A campaign is in progress which has for its object the raising of more food stuffs for home consumption. The author is of the opinion that the application of such a programme to the plantation or tenant farmer is of the utmost importance. He urges business men and those who extend credit to see that the landlord furnishes garden plots and compels his tenants to raise gardens, keep chickens and, if possible, a cow. It is confidently asserted that if every individual farmer and tenant farmer would carry out this proposal and that if arrangements were made for the slaughter and sale of a few beef cattle in every community, pellagra would be greatly reduced and much economic benefit would accrue.

A. D. B.

FERREIRA (Manuel J.). Hématologie de la pellagre. [**The Blood in Pellagra.**]—*C. R. Soc. Biol.* 1928. Feb. 24. Vol. 98. No. 7. pp. 549–551. [1 ref.] [Inst. of Histol. & Embryol., Faculty of Med., Porto.]

Studies of the blood in pellagra have been made by numerous workers, but an analysis of the literature shows that the findings are not in agreement. This paper records observations made upon 36 pellagra cases, in all grades of severity.

Anaemia was constantly found and anisocytosis was frequent. In nine cases the R.B.C. count varied between 2,900,000 and 3,500,000, while in 20 cases the number was below 4 million. The white cell count ranged between 3,900 and 8,250. A lymphocytosis was found in nearly all cases and was most marked in those of slight severity. The percentage of mononuclear cells was usually normal, but an

eosinophilia was noted in over half the cases and seemed to be associated with a predominance of nervous symptoms.

The author attempts to arrive at the significance of the above findings. The anaemia represents a lowered vitality of the haemopoietic system, especially the bone marrow. The lymphocytosis is similar to that found in beriberi, scurvy, inanition and glandular affections, such as hypo-function of the thyroid and suprarenal. The eosinophilia is accounted for by vagal hypertonia, resulting from an endocrino-sympathetic dysfunction.

A. D. B.

MOLLOW (W.). Ueber Beziehungen der Pellagra zur perniziösen Anämie. [**Relations of Pellagra to Pernicious Anaemia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. May. Vol. 32. No. 5. pp. 250–253. [2 refs.] [Intern. Clinic., Univ. Sofia, Bulgaria.]

Pellagra and pernicious anaemia, when each is fully developed, represent distinct clinical entities. There are, however, many points of similarity and in some cases the diagnosis is in doubt. Two cases from the University Clinic at Sofia are described. *Case* 1. A fifty year old peasant woman. For 18 years she had suffered from typical pellagra attacks occurring in the spring and associated with diarrhoea and sore tongue. On examination she presented the following:—anaemia; a sub-icteric tinge of the skin; a raw and fissured tongue; achylia; slight splenic enlargement. In the blood the R.B.C. numbered 730,000 with marked anisocytosis, poikilocytosis and polychromasia. The haemoglobin was 20 per cent., the colour index 1·3 and the leucocyte count 3,800. Her condition improved and she left the clinic.

*Case* 2. An ill-developed girl of 16 years. She came under observation at the clinic in August, 1927. For the last three years she had suffered each spring and summer from dermatitis of the hands and diarrhoea. She was quite well in the winter. She had eaten largely of maize bread, and pellagra was diagnosed. On examination she presented the following:—anaemia; pigmented, raw and hyperkeratotic skin on hands and feet; smooth tongue; no splenic enlargement; R.B.C. 700,000 with some anisocytosis, slight poikilocytosis and polychromasia. The haemoglobin was 15 per cent., the colour index 1·1 and the leucocytes numbered 2,850 with some lymphocytosis and 8 per cent. eosinophilia. (Ascaris infection was present.) Van den Bergh reaction was negative and there was absolute achylia. Pernicious anaemia was diagnosed and under liver treatment she made a remarkable recovery, the diarrhoea stopped and she gained weight.

These two cases appear to be pellagra in which haemolytic anaemia has supervened. The author believes that both conditions are due to an intestinal toxin which in some cases attacks the central nervous and sympathetic nervous system giving rise to pellagra, and in others the haemopoietic system causing pernicious anaemia.

A. D. B.

RILLE. Ueber Pellagra. [**Pellagra.**]—*Arch. f. Dermat. u. Syph.* 1928. Apr. 23. Vol. 155. (Kongressbericht). pp. 227–229.

A female case of pellagra was admitted to the Leipsic Dermatological Clinic in July, 1926. The patient came from Poland and had not lived upon

an exclusive maize diet. She presented the typical skin appearances of the disease in the usual situations, including the neck. Areas of dermatitis were observed on the back, in the axillae and on the elbows. The tongue was denuded and red at the tip and a vulvitis was present. There was no rash on the face and no mention is made of diarrhoea. Mental changes, amounting almost to paranoia, were noted.

The patient died after two days' pyrexial illness in November, when the rash had disappeared. No mention is made of an autopsy, though a necrotic inflammation of the pharynx, oesophagus, stomach and small intestine is given as the cause of death.

The author discusses the differential diagnosis of pellagra from the dermatological point of view. Sunburn in alcoholics and in cachectic cases may show a similar dermatitis. Tertiary syphilis also may give the same picture and, in three cases of arsenic poisoning, Casal's necklace was present.

A. D. B.

PAUL (Norman). **Pellagrous Dermatitis.**—*Med. Jl. Australia.* 1928. May 5. 15th Year. Vol. 1. No. 18. pp. 548–549. With 2 text figs.

A sporadic case of pellagra was shown by the author at a meeting of the Sydney Hospital Clinical Society.

Male aged 46. For thirteen years has suffered from progressive weakness. For some time he had been in an edentulous condition and has therefore lived mainly on farinacous foods, with a moderate supplement of beer. Dermatitis on the hands and forearms began five to six years previous to examination and the patient was under the author's observation for the last two years. It was noted that a small plate of bread and milk in the morning and a small cup of mutton broth in the evening, satisfied his appetite. He showed irritability, general weakness, vertigo, flatulence, soreness at the left angle of the mouth and he had suffered from ulcers on each eye. There was no diarrhoea and the urine was normal. Photographs show pellagrous dermatitis on the hands, forearms and neck. The face was also affected and the rash was accompanied by the usual subjective symptoms. Skin sections were examined.

A. D. B.

FINDLAY (G. M.) **Pellagra-like Lesions associated with Deficiency of Vitamin $B_2$ in the Rat.**—*Jl. Path. & Bact.* 1928. Apr. Vol. 31. No. 2. pp. 353–364. With 8 figs. on 2 plates. [21 refs.] [Labs. of the Imperial Cancer Research Fund, London.] [Summary appears also in *Bulletin of Hygiene.*]

The pathology of vitamin $B_2$ (anti-pellagric ?) as distinct from vitamin $B_1$ (antineuritic) deficiency was studied in the rat. Yeast (autoclaved at 120° C. for 5 hr.) was used as a source of vitamin $B_2$ and a yeast extract (Peters') as a source of $B_1$. Rats receiving $B_2$ only died in about 5 weeks, occasionally with symptoms of polyneuritis, and showing the histological appearances characteristic of starvation. Rats receiving $B_1$ and lacking $B_2$ lived longer (10–13 weeks) and in about 8 to 10 weeks developed skin lesions with loss of hair and ulcers of the mouth, death occurring in 2 to 3 weeks after the onset of skin lesions. A detailed histological examination of the tissues showed the pathological changes to be mild and characteristic of those found in

simple inanition. The squamous epithelium of the cardiac portion of the stomach showed in all cases a papillomatous proliferation, but this is considered to be due to the ingestion of hair which must contaminate the food in considerable amount. Hypertrophy of the suprarenal glands was a constant feature in rats lacking either $B_1$ or $B_2$, the histology of the gland being similar to that found after exposure of the rat to cold or in the presence of a slight toxaemia. The evidence obtained favoured the idea of the dual nature of vitamin B and it is noted that many of the features of vitamin $B_2$ deficiency in the rat bear a similarity to those of human pellagra.

H. N. H. Green.

UNDERHILL (F. P.) & MENDEL (L. B.). **A Dietary Deficiency Canine Disease—Further Experiments on the Diseased Condition in Dogs described as Pellagra-like by Chittenden and Underhill and Possibly Related to So-Called Black Tongue.**—*Amer. Jl. Physiol.* 1928. Apr. Vol. 84. No. 3. pp. 589–633. With 2 coloured plates. [10 refs.] [Depts. of Pharmacol. & Toxicol. & Physiol. Chem., Yale Univ., New Haven, Conn.] [Summary appears also in *Bulletin of Hygiene.*]

A disease may be induced in dogs in from 1 to 8 months by feeding on a diet containing boiled peas as the chief source of nitrogen. The disease is characterized by a foul stomatitis and an acute haemorrhagic ileocolitis, and spontaneous recovery does not occur. On pathological and clinical grounds it has been suggested that this syndrome is identical with the condition in dogs known as " black tongue," and that " black tongue " might prove to be the analogue of pellagra in man. The authors fed a diet containing dried peas, cracker meal and cottonseed oil to dogs and readily produced the disease. Many variations in this diet were made and as a result it was found that butter fat cured the disease. Vitamin A was naturally suspected as the potent factor, but good cod-liver oil proved useless in treatment or prevention, though it had a slight beneficial effect on the length of survival. The addition of yeast, an increase in the nitrogen intake whether in the form of peas or meat, or the addition of a salt mixture, did not prevent the disease, though the appearance of symptoms might be delayed. Fresh pig's liver prevented the onset of the disease, but both butter if stored (even in cold storage) and liver if dried at a low temperature, lost some of their potency. The observation that a sample of butter which had lost its curative potency had also lost its yellow colour, led to a search for the responsible agent amongst the carotinoid pigments. Egg yolk proved to contain the factor, but not in as large amount as butter, whilst carrots were found to contain more of the curative agent than butter fat. An ether extract of lard and carrots proved potent. Crystallized carotin (re-crystallized 6 times) in doses of 5mgm. daily, caused the symptoms to disappear in from 10–15 days and the dogs developed a marked degree of resistance to the disease when the carotin was withdrawn. If the effect is due to a contaminant of carotin, it must be present in very minute quantities. GOLDBERGER has reported no improvement in " black tongue " or human pellagra from the administration of butter fat, and failure to cure pellagra with carrots. The authors do not comment, for full details of GOLDBERGER'S work are not yet to hand.

H. N. H. Green.

GOLDBERGER (Joseph), WHEELER (G. A.), LILLIE (R. D.) & ROGERS (L. M.). **A Further Study of Experimental Blacktongue with Special Reference to the Blacktongue Preventive in Yeast.**—*Public Health Rep.* 1928. Mar. 23. Vol. 43. No. 12. pp. 657–694. [14 refs.]

The authors' summary of this long and detailed paper gives the main points and conclusions most clearly and is, therefore, quoted in full :—

"The blacktongue producing potency of a basic experimental diet and of three modifications was tested 33 times in 31 dogs with the production of 33 separate attacks of blacktongue. Only one of these attacks developed at the end of a period longer than 61 days.

"Experimental blacktongue is due to a dietary deficiency which is capable of being corrected by something contained in yeast.

"This something, or blacktongue preventive, in yeast is inactivated or destroyed by heat sufficient to char the yeast; retains its preventive potency in large measure, if not entirely, after heating in the steam autoclave at a pressure of 15 pounds for seven and one-half hours; and is adsorbed from an acidulated aqueous extract of either dried yeast or of yeast first autoclaved at a pressure of 15 pounds for two and one-half hours by English fuller's earth. It cannot be identified with any of the older well-recognized dietary essentials, but it is believed to be identical with the thermostable substance of Smith and Hendrick.

"The blacktongue preventive and the pellagra preventive are both present in yeast. Taken in conjunction with certain other evidence pointing to the fundamental identity of blacktongue and pellagra, this association strengthens the probability that the blacktongue preventive and the pellagra preventive, or vitamin P-P, are identical."

A. D. B.

GOLDBERGER (Joseph), WHEELER (G. A.), LILLIE (R. D.) & ROGERS (L. M.). **A Study of the Blacktongue-Preventive Action of 16 Foodstuffs, with Special Reference to the Identity of Blacktongue of Dogs and Pellagra of Man.**—*Public Health Rep.* 1928. June 8. Vol. 43. No. 23. pp. 1385–1454. [16 refs.] [Summary appears also in *Bulletin of Hygiene.*]

In these detailed experiments various foods have been tested for their preventive and curative properties in dogs on a standard basal diet known to produce blacktongue symptoms. The basal diets were based on the diets found in association with the occurrence of pellagra and contained usually a large amount of maize. Eleven of the foodstuffs were studied for their preventive action in both blacktongue and pellagra. In 8 of these, knowledge of their preventive potency in pellagra permitted a rough but satisfactory comparison and in each case the preventive potency for pellagra was strikingly similar to that for blacktongue. These findings considered with the clinical resemblance of the disease in dogs to that in man, the suggestion of a common aetiology by feeding experiments, the effectiveness of dried yeast in both conditions, together with the production of a pellagra-like condition in rats by feeding a diet deficient in a food factor indistinguishable from the blacktongue preventive, and the marked similarity of the histological tissue changes of blacktongue and pellagra, make it very probable that experimental blacktongue and pellagra are identical conditions. If this conclusion is correct, then the results of tests of preventive action in dogs are applicable to man. Maize, whole wheat, cowpea, milk, soy bean, butter, cod-liver oil, cotton-

seed oil, canned tomatoes, carrots and the rutabaga turnip were found to contain none or only slight amounts of the blacktongue preventive factor. Wheat germ, beef muscle, pork liver, canned salmon, egg yolk contain more or less adequate amounts of this factor. Liver, salmon and egg yolk, though not yet studied directly in pellagra, are recommended in the treatment and prevention of human pellagra on the basis of the dog-feeding experiments.

H. N. H. Green.

DENTON (James). **A Study of the Tissue Changes in Experimental Black Tongue of Dogs compared with Similar Changes in Pellagra.**—*Amer. Jl. Path.* 1928. July. Vol. 4. No. 4. pp. 341–351. With 6 figs. on 3 plates. [3 refs.] [Dept. of Path., Cornell Med. School, New York, N.Y.]

The morbid anatomy of the condition known as experimental black tongue in dogs is here described. The animals were chosen from among those used by GOLDBERGER in his experiments. They were killed by coal gas and autopsies were performed immediately after death.

The macroscopic appearances found post mortem were as follows:—

(*a*) *In the mouth.*—All grades of inflammation, varying from a reddening of the oral mucosa in early stages to superficial necrosis, with the formation of a pseudo-membrane, as the disease neared its termination. This latter condition was apt to spread downwards involving the whole upper alimentary tract.

(*b*) *Skin.*—Four out of seven male dogs showed lesions of the scrotal skin.

(*c*) *Intestines.*—Earlier cases showed no changes in this situation, but in three later specimens the colon was thinner than normal and the mucous membrane was reddened and stained with reddish brown mucus.

(*d*) *Other organs.*—No gross changes were found in the bones, periosteum, brain or cord.

Very thorough histological examinations were made of various organs and tissues and these are well illustrated by micro-photographs. It is impossible to give a detailed description of the changes met with in various situations, suffice it to say that the lesions "originate in a degenerative process affecting the superficial connective tissue of the mucous and dermal membranes." Secondary changes follow in the overlying epithelium and the final picture is one of an intensely necrotic and diphtheritic inflammation of the upper alimentary tract. No histological changes were found in the central nervous system or in any other organs.

A comparison between the above findings and those met with in human pellagra is given. "The lesions of the skin, mouth, pharynx, oesophagus and colon in pellagra and in experimental black tongue in dogs show very similar gross appearances. Histologically the lesions of both appear to have their inception in a degenerative process in an analogous tissue element. The processes of repair in both result in fibrotic replacement and in pathological vascularization of the superficial stroma of the mucous membrane of the upper alimentary tract and of the corium." Secondary infection tends to occur.

A. D. B.

## HEAT STROKE.

SMITH (Eben E.). **Heat Stroke : a Thermoregulatory Incompetency.**—*U.S. Nav. Med. Bull.* 1928. July. Vol. 26. No. 3. pp. 479–502. With 6 plates. [34 refs.] [U.S. Nav. Med. School, Washington, D.C.]

This is a general review of the effects of heat on the thermo-regulatory mechanism of the body, to which are added certain personal observations on the pathology of the tissues in animals (dogs) dying of heat exhaustion [see this *Bulletin*, Vol. 25, p. 322 (HALL & WAKEFIELD)] The paper contains nothing absolutely new, but it is an excellent summary of work done by others during the past years and the author gives a most valuable list of references. Plates are given showing the morbid histology of the colon, intestinal mucosa, kidney and thyroid in the animals examined by the author.

J. H. Tull Walsh.

LEGER (Marcel). Considérations sur le coup de chaleur. [**Notes on Heat Stroke.**]—*Rev. Prat. Malad. des Pays Chauds.* 1928. Jan. Year 7. Vol. 8. No. 1. pp. 7–17. [7 refs.].

This is a general review of " sun stroke " and " heat stroke." The author refers to the different rays of the spectrum and the fact that each or all combined may produce evil conditions according to length of time of application. He refers to the deaths of three chimpanzees at the Institute of Biology, Dakar—see this *Bulletin*, Vol. 20, p. 70 (LEGER). Since then the author has made experiments on guineapigs exposed to 40°—45° C. with hygrometric conditions varying from 45 to 76. He has observed :—Diminution of red blood corpulscles and lowering of total haemoglobin ; a disturbance of leucocyte equilibrium, with polynuclear neutrophiles and diminution of eosinophiles and deviation to the right of the Arneth image.

J. H. T. W.

SCHAEFFER (Henri F.). Recherches sur la thérapeutique du coup de chaleur. [**Treatment of Heat Stroke.**]—*Ann. d' Hyg. Pub. Indust. et Sociale.* 1927. Apr. Vol. 5. No. 4. pp. 224–231.

The author begins with a general review of the pathological conditions accompanying heat stroke. Turning to treatment he mentions baths, cardiac tonics, bleeding and injection of artificial serum. He thinks it better to place the patient in a bath at 37° C. and to reduce the temperature with blocks of ice rather than begin at once with a very cold bath ; there should be good ventilation and electric fans to cool the air. But the most important part of the treatment is to renew the fluid in the organism. For that purpose subcutaneous injections of artificial serum should be used. BONNETTE has employed this method in heat syncope. " In very serious cases one should proceed to slowly inject luke-warm serum into a vein without considering it necessary to previously withdraw a certain amount of blood." The author also considers that subcutaneous injections of oxygen and, if necessary, intracardiac injections of adrenalin would be of use in heat asphyxia.

J. H. T. W.

i. THROWER (Rayner). **Heat Cramp.** [Memoranda.]—*Brit. Med. Jl.* 1928. Mar. 31. p. 546.
ii. HALDANE (J. S.). **Heat Cramp.** [Correspondence.]—*Ibid.* Apr. 7. pp. 609–610.

i. The author refers to cases analogous to fireman's cramp occurring amongst the engine room staff of a modern motor vessel, who, though submitted to hard work, do not have the excessive toil of the ordinary ship's fireman. The high engine-room temperature (130° F.) sometimes reached in the tropics is an obvious factor, but associated with it is the rather stagnant air, which is vitiated by exhaust fumes with a high percentage of carbon dioxide. The cases occurred in men of the finest physique, the onset occurring after several days' exposure to the conditions, with malaise, headache and crampy pains in the limbs and abdomen. The body temperature was well over 100° F., with rapid pulse. Twenty-four hours off duty, with drugs to relieve pain and body fluids replaced, served to restore them to normal. As a prophylactic the addition of salt in small amounts to the drinking water, seemed to prove efficacious. Heat cramp in firemen is usually ascribed to excessive tissue fluid and salt loss.

ii. Professor Haldane, commenting on the cases described above, entertains little doubt that the cause of the cramp is acute poisoning by water. The " osmotic pressure " of the blood must be kept constant. It depends on the relative concentrations of water molecules and, in the case of the blood, more particularly on the concentrations of sodium chloride. The kidneys regulate this osmotic pressure ; but in men engaged in heavy muscular exertion they are almost completely thrown out of action. A man who is sweating hard and working hard and is at the same time drinking water to relieve thirst, is losing chloride rapidly and replacing the sweat, which contains about a quarter per cent. of sodium chloride, by practically pure water. The kidneys cannot deal with the excess water pressure and the result is acute rise in the diffusion pressure of water or fall in the " osmotic pressure " ; and violent attacks of cramp are symptomatic of this. [v. this *Bulletin*, Vol. 23, p. 457 (*U.S. Nav. Med. Bulletin*).]

J. H. T. W.

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HOFFMANN (W.). Ein Fall von Sonnenstich.—*Schweiz. Med. Woch.* 1927. Oct. 15. Vol. 57. No. 42. pp. 1008–1009. [2 refs.]
HUIZENGA (L. S.). A Case of Heat Stroke.—*China Med. Jl.* 1927. June. Vol. 41. No. 6. p. 566.

## BLACKWATER FEVER.

STEPHENS (J. W. W.). **The Distribution of Blackwater Fever in Europe.**—*Ann. Trop. Med. & Parasit.* 1927. Dec. 31. Vol. 21. No. 4. pp. 467–478. With 3 maps. [43 refs.]

——. **The Distribution of Blackwater Fever in South West Asia.**—*Ibid.* 1928. June 12. Vol. 22. No. 1. pp. 53–58. With 2 maps. [15 refs.]

Under the title blackwater fever are included cases designated as quinine haemoglobinuria. In the first paper cases which occurred during the Great War are excluded, owing to the uncertainty as to where they really originated; cases occurring in patients who have recently returned from the Tropics are also excluded. The papers consisted of a series of records showing the distribution of the disease. They are illustrated by maps and contain an extensive bibliography.

W. Yorke.

POPOW (Peter) & ZEISS (Heinz). Weitere Untersuchungen ueber das Schwarzwasserfieber in Russland. [**Further Investigations of Blackwater Fever in Russia.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 438–445. [15 refs.] [Trop. Inst., & Pasteur Inst., Moscow.]

The following summary is given :—

1. Blackwater fever in Russia has hitherto been observed in St. Petersburg, Moscow, Kasan, Saratow, Astrachan, Noworossijsk, Batum, Suchum, Baku, Transcaucasia (Araxtal) Sowjetarmenia (Eriwan and district), Transcaspia (Merw and district). The damp districts are specially afflicted ; i.e., the ports and coast towns (St. Petersburg, Noworossijsk, Batum, Suchum, Baku), the towns lying on rivers (Kasan, Saratow, Astrachan, Moscow) ; and the river valleys and coast oases (Araxtal, Merw, Grosny, Sanaim, Eriwan).

2. The natives are attacked in the same manner as strangers.

3. Altogether the authors have obtained information regarding 337 patients suffering from blackwater fever in Russia. Of these, 297 (88·1 per cent.) were men and 40 were women. The death rate varies. It is recorded by different observers as 0 per cent., 8 per cent., 11 per cent. 20 per cent., 22 per cent., 39 per cent., 50 per cent., 100 per cent.

4. The average death rate was 41·4 per cent.

5. The interval between the attack and the malarial infection is variously given as : 1 day, 1–6 months, 2, 6, 19 and 34 years.

6. Blackwater fever cases occur in Russia in the winter or in the early spring or late autumn. The climatic cold in Russia plays in the precipitation of blackwater fever a definite, but not a decisive part.

W. Y.

CHELL (G. R. H.). **Report on Blackwater Fever in Uganda for 1926.**—*Uganda Protectorate Ann. Med. & San. Rep. for the Year ended 31st December, 1926.* Appendix No. 1. pp. 61–64.

Of the 170 cases of blackwater reported in Uganda during the year 1926, 50 were fatal. The case death rate is not markedly above the average, but there has been a decided increase in the morbidity rate, both among Europeans and Asiatics. The author believes this to be

associated with the fact that there was a decided increase in the rainfall during the year, and that four of the cases occurred among Europeans and seven among Asiatics employed on railway construction. One of the most noticeable features brought out in the review of the cases is the decided influence of exertion or exposure during an attack of malaria in precipitating the onset of blackwater fever, more especially in conjunction with a history of alcoholism and insufficiently treated malaria.

The general summary of the signs and symptoms exhibited by the cases is given.

In a series of eleven tables data are collected showing (1) the number of cases, deaths, and case mortality from this disease in Uganda for the past twenty years; (2) the stations or localities at which blackwater was contracted; (3) the race and sex incidence; (4) the ages of the patients; (5) the distribution of the cases in the non-official sections of the population; (4) the length of residence in the tropics; (7) the number of previous attacks of blackwater; (8) mosquito protection, quinine habits; (9) the result of blood examination; (10) the cause of death; and (11) the duration of haemoglobinuria.

W. Y.

CARPENTER (G. D. Hale). **A Case of Blackwater Fever in an African Native.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Nov. 25. Vol. 21. No. 3. pp. 237–238.

A brief clinical account is given of a case of blackwater fever in an Acholi native. The notes are admittedly very incomplete and it is much regretted that the urine was not examined microscopically. The patient made an uninterrupted recovery. Six other cases with similar symptoms were shortly afterwards reported by the native dresser, all of them in Madi natives. Carpenter remarks that it is of interest that the natives are apparently unfamiliar with the disease and have no name for it. He records that the medical officer of Madi was attacked with blackwater fever a few months before the native, who was the subject of this paper, developed his attack.

W. Y.

MACKEY (C.). **Blackwater Fever in a Native Child.**—*West African Med. Jl.* Lagos. 1928. Jan. Vol. 1. No. 3. p. 43.

Details are given concerning an attack of blackwater fever in a child 2½ years old. The boy was born in West Africa and had lived at Warri for about a year prior to the attack of blackwater. He had had several attacks of malaria. On the day the attack commenced, the child was reported to have eaten a hearty breakfast about 11 in the morning. At 1 p.m. there was a rigor, and at 2 p.m. dark, brown urine was passed. At 9 a.m. the next day jaundice was noticed. Vomiting set in, and the restlessness and thirst were more pronounced. Temperature 102°, pulse 166, respirations 30. Four ounces of brown urine were passed. The blood films contained *P. falciparum*. Two hours later the patient became unconscious and death supervened at 1 p.m.

W. Y.

SENIOR-WHITE (Ronald). **A Case of Identical Delirium in Repeated Attacks of Blackwater Fever at Long Intervals.** *Indian Med. Gaz.* 1928. May. Vol. 63. No. 5. pp. 271–272.

The patient, who first went to the tropics in 1901, had an attack of malaria in East Africa in 1903, and subsequently after his return to

Johannesburg developed blackwater fever. This attack was accompanied by delirium, which was associated with the rather troublesome work on which he had previously been engaged. After the blackwater fever he was invalided home. Subsequently, he went to India and had more malaria between 1907 and 1915, becoming a "chronic relapser"; but after this period his condition improved, and he described himself as having become acclimatized. After September, 1926, he had another attack of blackwater fever, and during this attack he experienced delirium absolutely identical with that of his primary attack twenty-three years previously with the same delusion of counting gusset plates. The author points out that the occurrence of the delirium after such a long interval, and especially after twelve months' employment on totally different duties is interesting.

W. Y.

CASTEX (Mariana R.), GONZÁLEZ (Hernán) & POLETTI (Roque A.). La hemoglobinuria malárica. [**Malarial Haemoglobinuria.**]—*Prensa Méd. Argentina.* 1928. Apr. 20. Vol. 14. No. 32. pp. 1145–1153. [22 refs.]

This is an account of a man of 27 years whose history was known from the time of a first attack of malaria in September, 1924, with recurrences at intervals till February, 1928, when on the morning following an attack he took a tablet of sulphate of quinine at 4 a.m., and another at 7.30 a.m. At noon he had a violent shivering fit with headache and vomiting and haemoglobinuria. He was treated by injections of caffeine and adrenalin.

The case was one of average severity and recovery took place. The remainder of the paper is occupied with general remarks on the condition and a brief but clear description of GHIRON's haemolysis curve and the way in which it is obtained.

H. Harold Scott.

TRABADOROS (A. G.). Die Therapie des Schwarzwasserfiebers. [**The Therapy of Blackwater Fever.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. May. Vol. 32. No. 5. pp. 229–235. [1 ref.] [Municipal Hosp., Patras, Greece.]

In the Province of Patras (Greece) blackwater fever is still treated with large doses of quinine and ostensibly with good results. Between 1898 and 1927 there were 16,127 patients in the state hospital of Patras; amongst these 3,568 (22·13 per cent.) were malarial and of these 51 had blackwater fever and 7 died. The general treatment given is 1 to 1·5 gm. of quinine intramuscularly twice daily on the first, second, third and fourth days until the fever subsides; and in addition diuretics, glucose and saline injections, ice compresses, and cardiac tonics. Quinine was never given orally on account of the digestive disturbances which are usually associated with blackwater. It is pointed out that of course this quinine treatment was only employed in cases in which there was no idiosyncrasy or tendency to renal haemorrhage. Thirteen of the sixteen cases seen by the author were cured by this treatment.

Reference is then made to the fact that others, especially the Germans, avoid quinine in blackwater. CARDAMATIS at Athens records 24·42 per cent. of deaths amongst those treated by quinine and 7·32 per cent. among those who were not given quinine. KLEMPERER and SCHILLING recommend the greatest caution in administering quinine to blackwater patients. The question therefore arises which method should be followed.

The author believes that quinine is indicated in all cases in which the patient has been infected with malaria for a long time, in which the attack was preceded by febrile disturbances and in which exposure and over exertion were the causes. In such cases, where for 24 hours no quinine has been given and no idiosyncrasy to the drug exists, the above treatment with large intramuscular injections of quinine should at once be given. The second method of treatment without quinine should be adopted in cases of quinine hypersensitiveness and further in cases in which even small doses of quinine cause bleeding from the nose and kidneys. This class of case has only occasionally been seen by the author in his practice. Furthermore, quinine is contra-indicated in cases in which, owing to excessive haemolysis, the strength of the patient is very much reduced, where the pulse is small and feeble, and where the heart is weak and the blood pressure low. In this class of case large doses of quinine may cause death through heart failure.

Therapy of blackwater fever must have four chief objects in view: (1) The haemolysis must be stopped; (2) Diuresis must be produced; (3) The organism weakened by haemolysis must be strengthened; (4) The remaining symptoms of the disease must be controlled.

There follows a summary of the various procedures by which the author believes these desirable results may be achieved.

The paper closes with a short summary of the author's experience of plasmochin in the treatment of malaria.

W. Y.

BURKE (Edmund). **A Note on the Intravenous Administration of Sodium Bicarbonate in Blackwater Fever.**—*Indian Med. Gaz.* 1928. Mar. Vol. 63. No. 3. pp. 130–131. [2 refs.]

Details are given of the successful treatment of a severe case of blackwater fever by intravenous injection of sodium bicarbonate (150 grains to the pint of distilled water) as recommended by HANSCHELL [this *Bulletin*, Vol. 24, p. 667].

Emphasis is laid on the following interesting features of the case:—

"(1) The patient was never in the habit of taking "prophylactic" quinine. His blackwater fever therefore was not connected with abuse of this drug.

"(2) No other drug was used throughout the illness except the sodium bicarbonate. Water, of course, was pushed after the vomiting ceased.

"(3) The marked diuresis and rapid return to normal of the urine produced by the comparatively small amount of sodium bicarbonate given—17½ ozs. (Hanschell gave his case two infusions of one pint each.)

"(4) The sodium bicarbonate undoubtedly promoted rapid and definite diuresis with alkalinity, thus preventing suppression from renal obstruction due to precipitated haemoglobin in the kidney tubules."

W. Y.

WESTPHAL (Kurt). Akute Hämolyse nach Chininbehandlung einer Impfmalaria. [**Acute Haemolysis after Quinine Treatment of a Case of Inoculation Malaria.**—*Klin. Woch.* 1927. Dec. 24. Vol. 6. No. 52. p. 2474. [5 refs.] [Psychiat. & Nerve Clinic, Univ., Marburg.]

In considering the risks of the malaria treatment WEYGANDT drew attention to that of quinine idiosyncrasy: this, however, is but rarely

seen and only three cases have hitherto been described—two by MÜHLENS and KIRSCHBAUM, and one by SCHILLING and JOSSMANN.

Details are given of a case which came under the observation of the author. The patient was a woman of 48 years of age, who contracted syphilis in 1914, and was found to be suffering from general paralysis in August, 1927. On August 27th she was inoculated intramuscularly with 10 cc. of malaria blood. The strain used had been employed for this purpose in the clinic for some time and had shown nothing abnormal. After the eighth paroxysm treatment was administered on account of cardiac failure. On October 17th a dose of ·3 gm. of quinine was given, during the evening ·15 gm. of myosalvarsan intramuscularly, and the next morning ·2 gm. of quinine. During this day the patient was observed to have become extraordinarily pale. Blood examination showed haemoglobin 40 per cent., erythrocytes 1,100,000 per cmm. and leucocytes 21,600 per cmm. The urine was not dark, but contained albumin, urobilin, and urobilinogen. The patient sank and died on the night of October 19th.

The post-mortem showed signs of general paralysis, malaria, and haemolysis, but threw no light on the aetiology of the blood destruction. SCHILLING considers such anaemias to be latent haemolysis, and blackwater to be only the anaphylactic increase of blood processes which are less acute in all cases of malaria. Such an explanation is probably correct. Even without quinine quite severe anaemia may arise in cases of inoculated malaria. In the cases cited the coincidence of the administration of quinine and the haemolysis suggests that over sensitiveness to quinine was a precipitating factor. Whether in this case quinine or salvarsan or both together caused the anaphylactic action cannot be determined.

W. Y.

Ross (G. R.). **Bilirubinaemia in Malignant Tertian Malaria and Blackwater Fever.**—*Brit. Jl. Experim. Path.* 1927. Dec. Vol. 8. No. 6. pp. 442–454. [11 refs.] [London School of Hyg. & Trop. Med., London.]

The author has investigated the question whether the bilirubinaemia which exists in malaria is due to bilirubin of the immature type, produced by the reticulo-endothelial system in excess of the "handling' capacities of the hepatic cells, or whether it is due to bilirubin of the mature variety which has been reabsorbed back into the blood as a result of an obstructive lesion somewhere in the biliary system distal to the actual hepatic cell. In an endeavour to prove blackwater fever to be a sequel or complication of malignant tertian malaria the nature and degree of bilirubinaemia was studied. Furthermore, it was desired to obtain information on the site of haemolysis in blackwater fever, so that BARRATT and YORKE'S (1909) claim that haemolysis took place in the blood stream could be compared with that of PLEHN (1920), who considers that it is extravascular and renal in origin: if the van den Bergh reaction gave indirect positive results in the disease, it could logically be concluded that haemolysis was intravascular.

The technique employed in the investigation was based on the recommendations of MCNEE and KEEFER (1925); the qualitative test employed was that of LEPEHNE (1920–21) and the quantitative that of THANNHAUSER and ANDERSEN (1921). Oxalated plasma—at least 2 cc.—was used whenever possible, in order that an adequate amount of fluid should be available for the colorimetric estimation, which was made with a Klett bicolorimeter. The colour standard first employed was an ethereal solution of iron rhodonate, but this was later

replaced by an aqueous solution of anhydrous cobaltous sulphate, which was found to give more satisfactory results. In cases of blackwater fever it was sometimes exceedingly difficult to read the results of both the qualitative and quantitative tests. The reasons for this, which depend on the presence of haemoglobinaemia, are discussed. In cases where the degree of haemoglobinaemia was high it was impossible to estimate the number of units of bilirubin present; although by comparison with a control test, in which sulphanilic acid was added alone to the plasma, it was possible to state that the test was strongly positive. The results, however, show that the degree of bilirubinaemia in blackwater fever is such that the error introduced in this way can be looked upon as being of minor importance. In addition to the van den Bergh reaction, the qualitative test introduced by FOUCHET was performed on the plasma of all cases. Here again the presence of blood pigment in the plasma interfered with colour development. The testing of the plasma was done as soon as possible after withdrawal as delay interfered with the rate and degree of colour development, and in the case of specimens sent from remote districts the number of units recorded is probably too low.

The results obtained on the examination of 30 cases of *P. falciparum* infection are shown in a table. In 29 of the 30 the degree of bilirubinaemia was above normal. As regards the degree of bilirubinaemia, 4 cases showed less than 1 unit, 12 between 1 and 2 units, 5 between 2 and 3 units, 3 between 3 and 4 units, 5 between 4 and 5 units, and 1 above 7 units. The last case was found to be infected with Schistosoma in addition to malaria; there was hepatic enlargement and the occurrence of a direct positive result indicated that an obstructive lesion was present. In those patients who had received quinine treatment the degree of bilirubinaemia tended on the whole to be greater. As the examination was invariably made within 24 hours of the commencement of adequate treatment the observations supported the statement of KINGSBURY that the immediate effect of oral quinine in malignant tertian malaria is to cause an increase in the degree of bilirubinaemia and that this rise may be observed for about 24 hours. Further observations showed that the ultimate result of quinine was to restore the degree of bilirubinaemia to normal. There is, therefore, justification for the belief that one of the results of quinine administration in malaria is the production of an intravascular haemolysis. As the ultimate result of quinine treatment is to reduce the bilirubinaemia to normal and as this improvement is synchronous with the abatement of the clinical symptoms of the disease and the disappearance of parasites from the blood, it can be reasonably assumed that the initial haemolysis after quinine is due to lysis of infected corpuscles and that the ultimate reduction of the bilirubinaemia indicates failure of the parasites to infect further cells. The Fouchet test gave little information beyond demonstrating an excess of bilirubin, and is not so delicate as the van den Bergh reaction.

Turning to the question of bilirubinaemia in blackwater fever the author states that it was important to determine to what extent bilirubinaemia was influenced by the clinical type of the disease and consequently the cases were classified as follows:—

Type 1: Cases with malignant tertian malaria in whom extremely mild haemoglobinuria developed.

Type 2: Cases with definite haemoglobinuria of moderate severity; no suppression; recovery.

Type 3: Cases with severe haemoglobinuria; no suppression; death in 24–48 hours.

Type 4: Cases with severe haemoglobinuria; almost immediate suppression; anuria lasting 7–10 days; death.

Type 5: Cases with long-continued haemoglobinuria lasting up to a week; no suppression; recovery.

The results of the Fouchet and van den Bergh tests on these 5 types of blackwater fever are given in the following table:—

TABLE III.

| Type. | Case No. | M.T. parasites at time of examination. | Fouchet | Van den Bergh. Direct. | Van den Bergh. Indirect. | Time of examination. | Recovery or death. |
|---|---|---|---|---|---|---|---|
| Group I | 1 | + | ++ | 0 | 6 | 1st day | Recovery |
| | 2 | + | ++ | 0 | 6 | ,, | ,, |
| | 3 | + | ++ | 0 | 6·4 | ,, | ,, |
| | 4 | + | ++ | 0 | 6·8 | ,, | ,, |
| Group II | 5 | + | ++ | 0 | 10·4 | ,, | ,, |
| | 6 | — | ++ | 0 | 8·5* | ? | ,, |
| | 7 | — | ++ | 0 | 6·8* | ? | ,, |
| | 8 | — | ++ | 0 | 5·2* | ? | ,, |
| | 9 | + | ++ | 0 | 16 | 1st day | ,, |
| | 10 | — | ++ | 0 | 8·2 | ,, | ,, |
| | 11 | — | ++ | 0 | 9·1 | ,, | ,, |
| | 12 | — | ++ | 0 | 7·4 | ,, | ,, |
| | 13 | — | ++ | 0 | 11·6 | ,, | ,, |
| Group III | 14 | — | ++ | 0 | 20·8 | ? | Death |
| | 15 | + | ++ | 0 | 6·5 | 1st day | ,, |
| | 16 | — | ++ | 0 | 13† | ,, | ,, |
| Group IV | 17 | — | ++ | ++ | 18·4† | 3rd day | ,, |
| | 18 | — | ++ | ++ | 27 | 4th day | ,, |
| | 19 | — | ++ | ++ | 59 | ,, | ,, |
| Group V | 20 | — | ++ | 0 | 6·2 | 1st day | Recovery |
| | 21 | — | ++ | 0 | 11·4 | ,, | ,, |

* Specimens in which more than 24 hours had elapsed between withdrawal and examination.

† Approximate values. Excess of free haemoglobin in plasma.

Clinical details are given of a number of these cases when they are considered to be worthy of special attention. From this table it is seen that all cases gave a degree of bilirubinaemia which is much higher than that which exists in malignant tertian malaria. In all but two an indirect positive result was obtained; this indicates that the bilirubinaemia, initially at least, is due to the abnormal haemolysis which occurs in the disease and represents an increased effort on the part of the normal mechanism of disposal to get rid of the excess of circulating haemoglobin. The fact that bilirubinaemia of this type exists can further be said to prove the truth of BARRATT and YORKE's theory that haemolysis is intravascular, for no such phenomenon would accompany an extravascular haemolysis in the renal tubules.

It would appear that if the haemoglobinaemia is such that it can be directly represented by a bilirubinaemia of less than 6, the renal

mechanism of disposal is not called into play ; at, or about this value, the haemoglobin begins to appear in the urine.

The author considers that the reticulo-endothelial system must be regarded as an important factor in the disposal of free haemoglobin, but must be divorced from any connexion with the appearance of haemoglobin in the urine. Haemoglobinuria depends upon the rate and extent of the haemolytic process, and once a certain renal threshold value for haemoglobin has been reached, excretion of haemoglobin by the kidney begins. The extent and duration of the bilirubinaemia depends upon the rapidity and extent of the excretion of haemoglobin by the renal route, and also upon the capacity of the body to dispose of the additional bile formed.

Referring to the mechanism of excretion of free haemoglobin, Ross states that apparently the appearance of haemoglobin in the urine depends entirely on the concentration of haemoglobin in the plasma. In malaria cases, haemolysis, though sudden, is relatively slight, the threshold value for haemoglobin is not reached, and the reticulo-endothelial system is able to dispose of the excess present. When the concentration of haemoglobin exceeds the threshold value immediate excretion by the kidneys occurs and the reticulo-endothelial system at the same time becomes active in an independent effort to remove the haemoglobin. The extent to which the latter is called upon depends on the rate and degree of renal excretion and when anuria occurs it may have to undertake the whole duty. In these cases there is a possibility that obstruction of the whole biliary system may supervene and that a complete cessation of the whole excretory mechanism may occur. It can be assumed that the renal threshold value for haemoglobin does not vary with the individual, but can be represented by a uniform constant value.

W. Y.

Ross (G. R.). **Erythrocyte Fragility Test.**—*Ann. Trop. Med. & Parasit.* 1928. June 12. Vol. 22. No. 1. pp. 5–16. With 3 graphs in text. [10 refs.]

Reference is made to recent papers dealing with the technique of the erythrocyte fragility test and the disadvantages and limitations of the test as usually employed, i.e., adding a measured quantity of blood to solutions of sodium chloride of diminishing concentration and noting by naked eye observation the points of commencing and complete haemolysis, are discussed. In order to overcome the theoretical and practical disadvantages associated with the usual manner of testing the erythrocyte fragility, at least two modifications in the technique are necessary. In the first place, the ionic constitution of the hypotonic fluids must approximate to that of the plasma, and secondly the test must give an adequate idea of how the resistance of the erythrocytes is distributed during haemolysis. These essentials have been borne in mind in the test devised by Simmel. In this a standard fluid of the following composition is first made up :—

| | |
|---|---|
| Sodium chloride ... ... ... | 8·2 grammes |
| Potassium chloride ... ... ... | 0·2 ,, |
| Magnesium chloride ... ... ... | 0·2 ,, |
| Calcium chloride ... ... ... | 0·2 ,, |
| Sodium acid phosphate ... ... | 0·2 ,, |
| Sodium bicarbonate ... ... ... | 0·05 ,, |
| Distilled water ... ... ... | 1,000 cc. |

This fluid, it is claimed, is isotonic with whole blood, is buffered to the same degree, and contains the salts practically to the same amount as they are present in blood. A series of hypotonic solutions is then made up, these solutions containing, respectively, 70 per cent., 60 per cent., 50 per cent. and 40 per cent. of the standard fluid, each being made up to 100 cc. with the distilled water. The test is conducted as follows :—

" An erythrocyte count is made in the usual manner, employing Hayem's fluid, or the standard fluid, as the diluting medium. At the same time, in ordinary blood pipettes, blood is diluted 1 in 400 with each of the four hypotonic fluids. The blood is thoroughly mixed and the pipettes allowed to stand at room temperature for one hour. At the end of this time, the pipettes are again thoroughly shaken and the number of erythrocytes remaining are counted on any of the usual forms of blood-counting apparatus. The results are expressed first as content per 1 c.mm. of blood, and the figures then reduced to percentages of the normal erythrocyte count previously determined.

" Thus in the test a numerical computation of the number of surviving erythrocytes at the various degrees of hypotonicity is substituted for ocular appreciation of degrees of haemolysis, which substitution undoubtedly permits of more accurate knowledge being obtained of the process of haemolysis and the distribution of resistances amongst the corpuscles."

The results which hitherto have been obtained by the ordinary fragility test have been for the most part negative in blackwater fever. STEPHENS and CHRISTOPHERS, CHRISTOPHERS and BENTLEY, and DUDGEON have reported no change from the normal, but BIJON is quoted as finding diminished resistance, whilst other authors have reported increased resistance. With the object of obtaining further and more detailed information, a number of cases of blackwater fever and malaria, along with normal persons, were tested by Simmel's technique, which was slightly modified in one particular, viz., that the sodium chloride content of the standard fluid only was reduced, the other constituents remaining constant. The behaviour of normal erythrocytes, or erythrocytes from cases of malignant tertian malaria and from cases of blackwater fever is shown in tables and charts. No appreciable change from the normal curve of erythrocyte resistance to hypotonic saline was demonstrated in blackwater fever. This, the author considers, can be most easily explained by the fact that resistance to hypotonic saline is no guide to the resistance possessed by the erythrocytes to other haemolytic processes. It seems perfectly legitimate to conclude that the haemolytic process in blackwater fever is one which is independent of osmotic changes in the corpuscles.

Reference is made to BARCROFT's recent work on the spleen, and to the fact that he considers that the more fragile the corpuscle is to hypotonic saline, the more likelihood there is of its being retained in the splenic pulp. Ross states that the situation may be summarized by saying that if the haemolytic process of blackwater fever takes place in the general circulation, then results of hypotonicity tests would seem to prove that osmotic changes in the corpuscles do not account for the phenomenon, but the possibility of the process taking place in some organ, probably the spleen, must always be considered in each case. Even if osmosis were responsible, no change in the circulating corpuscles could be expected as long as the spleen retained its differential filtering function.

W. Y.

LEGA (Giulio). Sul processo emolitico nell'emoglobinuria dei malarici. [**On the Haemolytic Process in Malarial Haemoglobinuria.**]—*Riv. di Malariologia.* 1928. Mar.–Apr. Vol. 7. No. 2. pp. 85–95. [9 refs.] [English summary p. 213.] [Royal Inst. of Clin. Med., Rome.]

Experiments were performed in order to ascertain the haemolytic power of the serum of malaria cases in which attacks of haemoglobinuria were provoked by quinine, quinidine, or cinchonine. The serum was mixed with the hydrochlorides of the alkaloids and tested with erythrocytes of malarial or haemoglobinuric patients by means of Ghiron's technique.

Haemolysis always occurred in the quinine tubes; it also occurred with quinidine when used with the serum of a quinine, or quinidine, haemoglobinuric patient. With cinchonine the reaction was positive only if the serum was obtained from a cinchonine haemoglobinuric case.

These results point to the conclusion that quinine salts may provoke the haemoglobinuric paroxysm more easily than other salts, and that cinchonine salts are the best tolerated if the attack is not caused by the administration of cinchonine.

W. Y.

RAPOPORT (J. L.). Zur Pathogenese des Schwarzwasserfiebers. [**The Pathogenesis of Blackwater Fever.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Feb. Vol. 32. No. 2. pp. 69–82. With 6 text figs. [9 refs.] [II. State Univ., Moscow.]

The extent of the malaria epidemic in Russia during the last years has afforded an opportunity of studying, both clinically and pathologically, the various forms of this disease and of its complications. In Russia blackwater fever is extremely rare. Pathological details are given of a case which died in the Moscow clinic, and which, the author believes, throws some light on the mechanism of production of blackwater, and more especially on the site of the haemolysis. Regarding this question there appears to be three possible answers: (1) The haemolysis occurs in the entire blood stream, but in this case free haemoglobin should be seen in the blood; (2) Great haemolysis takes place in those organs which are normally concerned with this process, viz., liver, spleen, and bonemarrow; in this case the free haemoglobin would also pass through the blood: and (3) the destruction of erythrocytes is limited to the kidneys.

The occurrence of the first of these processes must be characterized by a number of appearances which accompany any intravascular haemolysis. One would expect on histological investigation of the organs to find a considerable number of shadow-erythrocytes since in a haemolysis lasting some days these could scarcely disappear from the blood. Moreover, the path of the free haemoglobin must be marked by an imbibition of all the organs and tissues of its decomposition products. The same must also apply in the second of the three possible alternatives. None of these appearances were, however, found on microscopical examination of the tissues of the author's patient; and this appears sufficient to throw doubt on the correctness of either of the first two hypotheses.

The author then goes on to quote from the literature regarding the rareness with which any substantial degree of haemoglobinaemia

has been found in cases of blackwater fever; and he also refers to the fact that no alteration in the osmotic resistance of the erythrocytes has yet been demonstrated in this disease.

The author considers as unsupported the tendency of certain authors (LEBEDEW, LEVY, SALVIOLI) to consider the changes in the kidneys of blackwater fever cases to be the result of filtration of free haemoglobin through them. The nephrotoxic properties of haemoglobin have long been known: various authors (SCHMIDT) have shown that even a continuous circulation of free haemoglobin in the plasma produces no widespread degenerative process or necrosis of the kidneys. Furthermore, the author was afforded the opportunity of examining the kidneys in a number of cases of arsenic poisoning in which acute haemolysis occurred, but in none of them did he find changes in the kidney comparable to those seen in blackwater fever.

These observations, in the opinion of Rapoport, render the first two hypotheses untenable and forces us to accept the third as the correct one. This has the support of GIEMSA, ACHARD, and especially of PLEHN. The author then considers in detail the hypothesis of PLEHN and other who agree with him, and finds support for this hypothesis in his own observations.

The conclusions are:—

1. In the case under observation a severe degenerative affection of the renal tubules, with well-marked desquamation of the epithelial cells and the formation of casts, had taken place.
2. Later, the basement membrane of the tubules and the walls of the neighbouring capillaries were destroyed.
3. In such places the blood escaped from the capillaries into the partially destroyed tubules.
4. In the tubules a rapid destruction of the erythrocytes took place, so that the haematuria was masked by haemoglobinuria.

[The author does not appear to be familiar with the experimental work of the reviewer on this subject (1911) nor with the much more recent work of other English authors. PLEHN's theory has been discussed at length in this *Bulletin*, Vol. 19, p. 631.]

W. Y.

EBERT (M. K.). Sur la pathogènese de l'hémoglobinurie dans le paludisme. [**The Pathogeny of Haemoglobinuria in Malaria.**]—*Arb. a.d. Microbiol. Inst. d. Volksunterrichtskommissariats.* 1927. Vol. 3. French summary pp. 399–400. [In Russian pp. 254–270. 12 refs.]

KRITSCHEWSKY and MOURATOVA (this *Bulletin*, Vol. 21, p. 386) have advanced the hypothesis that haemoglobinuria in malaria is provoked by the combined action of quinine and the lipoids of the organism. They showed that the serum of certain individuals is capable of activating *in vitro* the haemolysis of human red cells provoked by quinine. The action of the quinine is analogous to that of cobra venom; it is provoked by active serum as well as by serum inactivated at 56 to 62° C. for half an hour. The author assumes that the activating substance is lecithin, which is able to activate quinine *in vitro*. The individuality of the erythrocytes plays an important part in the reaction. The presence of haemoglobinuria depends upon the properties of the erythrocytes and of the serum. In malaria, as well as in other infections, transmutation of the lipoids is increased.

The author has confirmed all the findings of KRITSCHEWSKY and MOURATOVA. He has found that certain human sera activate the haemolysis provoked by quinine, but that other sera, on the contrary, inhibit it.

W. Y.

BLACKLOCK (D. B.) & MACDONALD (G.). **The Mechanism of Blackwater Fever and Certain Allied Conditions.**—*Brit. Med. Jl.* 1928. July 28. pp. 145–149. [30 refs.]

In this paper an etiological theory is advanced which the authors believe to be entirely new, but, which, from the evidence they have accumulated, they consider is correct.

It is generally agreed that blackwater fever arises mainly in the course of prolonged infection with *P. falciparum*. There is no evidence that this parasite produces a toxin different from that of the other malaria parasites and the explanation of the association must be sought in some other biological factor. The chief differential characters of *P. falciparum* are that it sporulates in the internal organs and that the cells containing the sporulating forms adhere to each other and to the vessel walls. The authors are convinced that the association between blackwater fever and *P. falciparum* must depend on these distinctive biological characters of this parasite.

Attention is drawn to a group of haemoglobinurias and haemoglobinaemias, which, at first sight, have little relationship to each other, but which on close investigation reveal notable features in common. These are: (1) blackwater fever, (2) pernicious anaemia complicated by venous thrombosis, (3) Raynaud's disease, (4) haemoglobinurias in dogs after exercise, (5) haemoglobinuria from marching, and (6) myoglobinuria in horses. It is considered that all these have the state of anoxaemia in common; a difference between them lies in the manner in which this is brought about.

The authors next pass to a consideration of the effects of deficient oxygenation, and refer to the recent physiological work of HILL, LONG, LUPTON, FURUSAWA, and others, from which it appears that deficiency of oxygen from whatever cause products an excess of lactic acid in the blood. As all the haemoglobinurias in the above list are associated with oxygen deficiency, the authors are driven to the conclusion that in each of them an excess of lactic acid is produced. It appeared then essential to investigate what haemolytic properties lactic acid possesses. A supply, as pure as possible, of sodium and ammonium dextrolactate and also of dextrolactic acid itself, was obtained from Dr. Martindale. The sodium and ammonium salt proved non-haemolytic, in any concentration possible in the human body, to human red cells *in vitro*. The acid proved highly haemolytic to washed red cells, complete haemolysis being obtained in a dilution of 1 : 600 and slight haemolysis in 1 : 1,200, when a 10 per cent. suspension of red cells was used. Further experiments were then undertaken to determine the haemolytic action on citrated whole blood, and from these *in vitro* experiments it appeared probable that if a concentration of 1 : 400 of sarcolactic acid could be brought about in the blood of an animal haemolysis would result.

Enormous quantities of sarcolactic acid are produced in the animal body by exertion, but it is extremely difficult to approach such quantities by means of injection. If strong solutions are injected, there is a risk of killing the animal; if, on the other hand, dilute solutions are used, the bulk of the injection is so great that the process

takes a long time to complete and the necessary haemolytic concentration is not obtained. The result of intravenous injections of various amounts and concentrations of lactic acid are given in a table. In two rabbits haemoglobinuria was produced and in several others haemoglobinaemia. The injection of 100 cc. of 2 per cent. solution resulted in haemoglobinaemia only, whereas the injections of 20 cc. of 4 per cent. solution produced haemoglobinuria. Evidence derived from *in vitro* experiments showed that the latter strength of acid, acting on different volumes of blood, produced different results according to the final concentration. When this was greater than 1 per cent., oxyhaemoglobin was not formed, while when haemolysis ensued at weaker concentrations oxyhaemoglobin was liberated. It appears probable that the concentration of acid which was responsible for the haemolysis in the rabbits lay between 0·25 per cent. and 1·0 per cent.

Summarizing their results to this point the authors state that they have shown that there exists in blackwater fever and certain allied conditions the common factor of deficient oxygenation; they have illustrated how this deficient oxygenation gives rise to the production of lactic acid; and finally they have shown that lactic acid is haemolytic *in vitro* and also *in vivo* in doses well borne by the animals.

It is considered that these facts make it probable that lactic acid is the haemolytic agent responsible for the production of blackwater fever. The anaemia produced by chronic malignant malaria, the stasis in the circulation of such an organ as the spleen brought about by the agglutination of parasitized red cells, and the frequently observed venous thrombosis result in a considerable degree of local anoxaemia and lactic acid accumulation. If the main exciting causes of blackwater fever be such as will produce contraction of the spleen, already enlarged in volume and choked with parasitized red cells, it is concluded that the circulation in the spleen will thereby still further be impeded and that the local anoxaemia will be increased.

On various grounds it is concluded that the commonest exciting causes of blackwater fever are exertion and chill, and that each of these produces marked contraction of the spleen. Quinine is another exciting cause and it likewise causes active contraction of the spleen. "The contraction of the spleen on agglutinated masses of parasitized red cells accentuates, as we have said, the local anoxaemia; further production of lactic acid necessarily follows, especially on exertion, and finally the local concentration reaches such a level that haemolysis occurs. Leakage of haemoglobin into the portal circulation results as soon as haemolysis commences, and becomes pronounced when the circulation through the spleen is re-established." It is probable that a similar process may go on in other organs and reference is made to the massive infection of the placenta in endemic areas.

A distinction in mechanism is made between typical blackwater fever and those occasional cases in which numerous parasites are present in the blood throughout the attacks. In the latter cases the most probable explanation of the haemoglobinuria is that it is largely due to direct destruction of infected red cells by the parasite during schizogony, a condition rather comparable with piroplasmosis of dogs than blackwater fever in man. [There does not seem to be much evidence in support of this hypothesis: the action on the red cell of *Babesia canis* appears to be essentially different from that of *Plasmodium falciparum.* In the one case the haemoglobin is set free more or less unchanged into the plasma, and in the other it is radically

changed. Again, a heavy blood infection with *Babesia canis* is invariably associated with intense haemoglobinaemia and haemoglobinuria; far otherwise is the case in heavy blood infections with *Plasmodium falciparum.*]

Statistics compiled by STEPHENS show that the majority of attacks occur after six months' residence and before the end of five years' residence in the tropics. The authors explain this on the ground that some time is required before the malaria parasite produces a marked degree of anaemia, and for the spleen to enlarge: the relative freedom in later years is due to fibrosis of the spleen and consequently less capability of contraction, and an acquired tolerance to the parasite.

It has long been recognized that there is a grave risk in moving a case of blackwater fever even with all possible precautions, and even for short journeys. The authors consider the explanation of this to be that the patient is extremely anaemic; in order to avoid discomfort to which he is subjected in transit he will contract his muscles continually, thus producing lactic acid in amounts which cannot be properly oxidized. It is to this lactic acid production that the relapses, which occur so frequently when blackwater fever patients are moved, are attributed. [Probably the authors are quite correct when they state that there is a grave risk in moving blackwater fever patients: but is the risk greater than that incurred in moving other classes of patient equally ill? Furthermore, what is the evidence that the risk is one of relapse of haemoglobinuria and not, for example, one of heart failure?]

The early and often intense jaundice of blackwater fever can, in the authors' opinion, be explained by the site of the haemolysis. The haemoglobin is usually delivered directly into the portal system and thus reaches the liver in a concentrated form.

[It is hardly necessary to emphasize, what will at once be evident from the extensive summary given above, that this article is a very ingenious hypothesis to explain the mechanism of the production of some of the cardinal symptoms of blackwater fever. It rests on a somewhat limited experimental basis and some of the statements and deductions are obviously open to discussion. Nevertheless, the article is a serious contribution, well worth consulting in the original, and one which is suggestive for future investigation. The discovery that a normal constituent of body metabolism, i.e., sarcolactic acid, has a haemolytic effect seems to be of considerable importance.]

W. Y.

NIERENSTEIN (M.). **The Mechanism of Blackwater Fever.** [Correspondence.]—*Brit. Med. Jl.* 1928. Aug. 4. p. 223. [4 refs.]

Referring to the article by BLACKLOCK and MACDONALD [*supra*], the author states that "it is obvious . . . in spite of the arguments brought forward by these authors . . . that sarcolactic acid by itself does not account for the precipitation of blackwater fever by quinine." He draws attention to an observation made ten years ago by himself that urines of thirteen cases of blackwater fever contained large quantities of a strongly haemolytic disintegration product of quinine to which the name haemoquinic acid was given [this *Bulletin*, Vol. 15, p. 433]. Like sarcolactic acid, haemoquinic acid is an oxidation product; the latter being derived from quinine through fission of the two nuclei.

W. Y.

## LABORATORY REPORTS.

MADRAS. **Report of the King Institute of Preventive Medicine Guindy for the Year ending 31st March 1927.** [KING (H. H.), Officiating Director.]—pp. 35+3. 1927. Madras: Govt. Press. [8 annas.]

In the vaccine-lymph business the number of doses issued during the year was well over 2¼ million. In primary vaccination the case success rate was 96·4, and the insertion success rate 87·6. In the routine of the bacteriology department a case of continued post-partum fever, where an organism of the paratyphoid group was isolated which did not react serously to any known types of paratyphoid A, B, C, is noticed; also a case of acute and fatal meningitis where a growth of paratyphoid C was obtained from the cerebro-spinal fluid. In the analytical chemistry department a stable preparation of a colloidal lead salt, believed to be novel, was devised, for treatment of cancer, by an adaptation of Amberger's method for the preparation of colloidal silver. In the various malaria-surveys the dangerous Anopheles usually observed were *culicifacies*, *fuliginosus*, *stephensi*, and *listoni*; in one locality in the Nellore district almost every inhabitant had a history of recent malaria, 96 per cent. of the children in the main village had malaria parasites in the blood, and the spleen-rate was 54·4; it is stated [without any further particulars] that in this locality "the infection rate in *A. culicifacies* and *A. fuliginosus* was as high as 10 per cent." Original research of an unusually purposive kind has been carried on, besides these malaria surveys. Among more than a score we may notice (*a*) an epidemiological and bacterial survey [in progress] of the Todas—an aboriginal tribe of the Nilgheri hills—undertaken on the information that their numbers are diminishing; (*b*) an investigation of streptococci in cases of puerperal fever, of which the conclusions from the first 200 cases are that *S. pyogenes* is the most important species, especially in severe cases, *S. subacidus* the next in importance, and *S. anginosus*—a common inhabitant of the vagina—not entirely unimportant; that in septicaemia the only organisms isolated were streptococci and *Bact. coli*, whereas in sapraemia a variety of other microbes was observed; and that the vagina of pregnant women in good health does not usually harbour pathogenic organisms; (*c*) a bacterial investigation of intraocular inflammations [which is the subject of a special report of the Ophthalmic Hospital]; (*d*) an attempt serologically to differentiate *Bact. coli* and all lactose-fermenters of human source from those of various outside sources [in progress]; (*e*) a study of Rhinosporidium confirming ASHWORTH'S discovery of its relations among the Fungi; (*f*) a study of 7 strains of non-typical vibrios found in water disclosing the fact that although by intra-peritoneal injection six of them were pathogenous to guineapigs none of these agglutinated with true cholera high-titre serum in any dilution. A purely scientific piece of work particularly felicitous in its instructive range and promise outside biology has been the study of the *Filaria flavescens* parasite of *Calotes versicolor*—an Agamid lizard common in gardens throughout India. The development of the micro-filaria has been discovered to take place very readily in *Culex fatigans*.

A. Alcock.

RANGOON. **First Annual Report of the Harcourt Butler Institute of Public Health, Rangoon, for the Year 1926.** [JOLLY (G.), Director.] —4 pp. With 2 plans. 1927. Rangoon. [As. 4=5d.]

This brief first annual report recounts the inception and creation of the Harcourt Butler Institute of Public Health in Rangoon. The staff under the Director includes an assistant, a chemist, an assistant chemist, and a bacteriology assistant, besides an officer to nurse an embryonic malaria bureau. The chemistry and bacteriology laboratories are at work, and classes of instruction for sanitary inspectors have been started. The beginnings of a library and museum are evident.

A. A.

UGANDA PROTECTORATE. **Annual Report of the Laboratory Services Division of the Medical Department for the Year ended 31st December, 1927.** [DUKE (H. Lyndhurst), Deputy Director of Laboratory Services.]—14 pp. 1928. Entebbe. [2s.]

This Annual Report includes an independent statement from the branch laboratory established in June at Kampala.

The Entebbe laboratory having been constituted the centre for trypanosomiasis research for the various East African Protectorates the experiment of housing the Veterinary Laboratory under its roof has been discontinued, and further facilities for research, including a self-contained six-bed ward for patients, and a cold-storage plant and refrigerating chamber, an electric centrifuge and shaker, and electric light for photography and dark-ground illumination—all supplied by an independently-owned plant ("there being as yet no electrical nor water supply for the Entebbe township") have been provided. The trypanosomiasis investigations in progress include studies in immunity and observations of the reaction of the mammalian host upon the transmissibility of the parasite by tsetse-fly. The duty of collecting and recording information about the distribution of tsetse-flies throughout the Protectorate has been undertaken. Examinations of fishermen working in the Uganda section of Lake Victoria, carried out during the last six months of the year, have disclosed not a single case of human trypanosomiasis among them.

Dr. MARTIN's investigations of 1,361 pond-snails from the shore of Lake Victoria have revealed 8 per cent. infected with cercariae, and of these infections 8 per cent. were fork-tailed cercariae, of five different types. The branch laboratory has been established to ensure for hospitals in Kampala and district (and for the rest of the country so far as circumstances permit) a well-equipped modern service of clinical pathology. Since the officer in charge must spend much time in visiting various hospitals in the vicinity "an interesting development is the commencement of systematic post-mortem examinations in certain cases." It is already apparent that malignant neoplasms are not uncommon among the local Africans.

A. A.

KENYA, Colony & Protectorate of: **Annual Report of the Medical Research Laboratory for the Year 1926.** [KAUNTZE (W. H.), Director.]—*Kenya Ann. Med. Rep. for Year ending 31st December, 1926.* pp. 89–121.

Most of this well-arranged report deals with what is sometimes spoken of disrespectfully as routine work; although it is not easy to

understand how in an outlying tropical country alert attention to the daily round is to be distinguished from research.

In the routine of the pathology section 18 sarcomata and 19 diverse carcinomata were observed among 44 tumours from native Africans. Of 5,470 blood-smears examined for malaria in the section of bacteriology, 2,333 showed parasites, the vast majority, namely, 2,244, of the single infections and 13 of a few mixed infections being *P. falciparum.* Multiple infestations of intestinal worms and protozoa were common; the number of cases in which Taenia were found was 862; of Trichuris, 530; of Ancylostoma, 516; of Ascaris, 484; of Strongyloides, 120; of *Schistosoma mansoni*, 87; of Oxyuris, 7. *Schistosoma haematobium* eggs were present in 6 out of 10 urines examined *ad hoc.* Bacillus of tubercle was found in 34 of 255 specimens of sputum. In the first 9 months of the year, when only spleen-smears of trapped rats were sent for inspection, only two out of 1,280 showed the plague bacillus; but when, in the last 3 months of the year, all the rats found dead were brought 25 per cent. were found infected. The report on medical zoology contains several interesting items. Of 154 stomach-contents of *Glossina palpalis* 24·6 per cent. gave the precipitin test for human blood. *Anopheles costalis* has been determined as *the* "domestic" species in Nairobi and in all the districts investigated, in the months March–September, and *the* dangerous species, since four out of 338 specimens caught in selected quarters were found infected with malaria parasites. It breeds in open pools and drying river-beds, but not in papyrus swamps (though such swamps in process of reclamation may provide good conditions for breeding). It also breeds freely in irrigation canals, improper drains, and borrow-pits. It is enormously prevalent over all other species during and after the long rains—the malarial fever season. At other times of the year *A. christyi* and *A. cinereus* take its place, but not in anything like the same numbers. *A. funestus*, *A. transvaalensis*, and *A. rhodesiensis* are rarely taken in dwellings; but *A. funestus* has seasons and places of abundance, and on two occasions a "wild" specimen has been found infected. *A. mauritianus*, *A. pretoriensis*, and *A. maculipalpis* are all numerous in certain places. The majority of house rats caught are the common *Rattus rattus kijabius*, and their predominant fleas are *Xenopsylla cheopis* and *brasiliensis* and *Echidnophaga gallinacea.* *X. cheopis* is the prevalent flea in towns and permanent buildings, *X. brasiliensis* in native huts and bomas. The following were the fleas taken from rats caught in plague-stricken villages: *X. brasiliensis*, 79; Echidnophaga, 25; Dinopsyllus, 2; Ctenocephalus, 3. In the biochemistry section a special study of native diets and nutrition in relation to disease and, in particular, to ulcers, is in progress.

A. A

South African Institute for Medical Research. **Annual Report for the Year ended 31st December, 1926.** [Lister (F. Spencer), Director.]—53 pp. With 2 charts & 2 plates. 1927. Johannesburg.

Of the 35 pages of this report that bespeak general professional attention 13 record the special and 22 the routine investigations of the Institute. From the research division we learn that active plague among veld rodents has been noted in three districts; that plague-infected fleas can survive in the veld, apart from a host, for 3 (or possibly

4) months and still be infective; and that the Namaqua gerbille (*Desmodillus auricularis*) possesses very considerable powers of resistance to plague. The fauna of the veld now known to get naturally infected with plague includes 11 species of rodents and 1 carnivore; and 6 other species of rodents and 2 other species of carnivora have been found susceptible experimentally. An idea is at work that the "Tiger River disease" of gerbilles, due to *Bacterium monocytogenes*, might be employed against these pestiferous veld rodents.

Research in entomology has been directed to the bionomy of rodent ectoparasites and to a mosquito survey of the Union. The entomologist notes, as a good and cheap way of destroying fleas in mealy bags, simple exposure of the bags to sun and wind.

In the helminthology department Dr. Annie PORTER records some interesting facts about *Schistosoma spindale*, a species first observed in cattle in India. She now reports two instances of human infestation with this parasite, in S. Africa, and the discovery of its molluscan intermediary hosts—*Planorbis pfeifferi* and *Isodora tropica*.

In the report of the routine department we may notice that amoebic was more prevalent than bacillary dysentery; that in blood examinations for malaria parasites the numbers of cases of benign and malignant tertian were about equal; that 11 cases of carcinoma and 2 cases of sarcoma were certified histologically in native Africans; and a brief account of a female case with a history of gonorrhoea, in which gonococci were discovered not in the expected places but only post-mortem by culture from vegetations on the aortic valves.

A. A.

PALESTINE. **Annual Report of the Laboratory Section Department of Health Government of Palestine for the Year 1926.** [STUART (G.), Administrative Officer in Charge.]—*Ann. Rep. Dept. of Health, Palestine, 1926.* pp. 58–87.

This is a very full and instructive report, from the bacteriology section, of which the following statistics of general interest are selected.

In the course of six years, during which 163,803 blood-films have been analysed, malaria parasites have been found in 23,745, the percentage of benign tertian being 66·25, of malignant tertian 31·69, and of quartan 2·06. Attention is drawn to the fact that this percentage of quartan is at startling variance with the 20·10 recorded by MÜHLENS from his examination of all cases of malaria in the same locality in December, 1912, and January, 1913.

Among 136 specimens of pathological tissues were 12 identifications of carcinoma, 4 of adenocarcinoma, 2 of adenoma, and 2 of sarcoma.

Among 26,620 urines examined eggs of *Schistosoma haematobium* occurred in 55. The distribution of infected snails, which was thought to be restricted to the vicinity of Jaffa, has now been found to extend to Um Khaled.

Tubercle bacillus was present in 463 of 2,671 specimens of sputa submitted. The leprosy bacillus was found in 19 out of 55 nasal smears taken from inmates of the local leper hospital.

The following species were observed in examination of 22,227 specimens of faeces: *Entamoeba histolytica* free in 1,963, and encysted in 265; *Giardia intestinalis* in 319; *Chilomastix mesnili* in 6; *Trichomonas intestinalis* in 659; and among worm eggs *Schistosoma mansoni* in 7, although "there is no authentic case of intestinal schistosomiasis having been contracted in Palestine."

Helminth statistics more comprehensive than those of the current year—80,942 examinations of faeces—may be taken as indicative of the relative incidence of species in Palestine, and are as follows :—

| | Number of persons infested. | Percentage of total cases of infestation. |
|---|---|---|
| *Trichuris trichiura* ... ... | 6,745 | 53·1 |
| *Ascaris lumbricoides* ... ... | 4,587 | 36·1 |
| *Taenia saginata* ... ... ... | 769 | 6·0 |
| *Oxyuris vermicularis* ... ... | 254 | 2·0 |
| *Hymenolepis nana* ... ... ... | 229 | 1·8 |
| *Ancylostoma duodenale* ... ... | 61 | 0·5 |
| *Schistosoma mansoni* ... ... | 60 | 0·5 |

Rat-catching goes on systematically at ports ; and of a total of 5,808 rats examined during the last four years 57 have been found plague-infected.

No case of rabies in man was recorded during the year although the 477 persons treated included 187 that had been bitten by animals definitely known to be rabid. Negri bodies were found in 59 of 76 animal brains examined. Only 3 cases of smallpox are known to have occurred, and there was also a general immunity to enteric and cholera. All these results are attributed to the efficacy of the vaccine department.

A. A.

WOLFF (J. W.). Jaarverslag van het pathologisch laboratorium te Medan-Deli over 1927. [**Annual Report of the Pathological Laboratory at Medan-Deli for 1927.**]—15 pp. With 1 plate & 1 fig. Medan.

In this report there is given an account of the staff and their movements, with various details of the educational, statistical and propagandist activities of the laboratory. Routine laboratory exminations were numerous : Bacteriological, 8,112 ; histological, 343, with 52 post mortems ; serological, Wassermann tests, 9,056, and a number of tests by the method of SACHS-GEORGI and KAHN ; chemical of water, stomach contents, faeces, urine and rice samples. The preparation of vaccine lymph and antisera is also undertaken.

W. F. Harvey.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE. 1928. Jan. 31. Vol. 21. No. 4. pp. 255–264. With 2 plates & 1 text fig. [2 refs.]. **Laboratory Meeting.**

Major H. C. BROWN demonstrated the application of the adhesion phenomenon to the differentiation of Leptospirae. Sir A. CASTELLANI exhibited cultures of fungi isolated from cases of blastomycosis. Dr. W. H. DYE exhibited certain "famine foods" from East Africa i.e., wild plants (chiefly tubers) containing much starch, but also much poison, and therefore not used for food except in times of dearth ; and then often used without the careful preparation requisite for removal of the poison, and sometimes with fatal effect in a whole family or community so as to simulate an outbreak of

infectious disease. Dr. H. M. HANSCHELL and J. C. GILROY exhibited sections of varicose vein displaying the effects of injection of quinine hydrochloride in occluding the lumen of the vein through damage to the intima; eventually cure and obliteration of the varicosity result by complete absorption of the fibrosed vein: in the course of 78 cases (involving 1,000 injections) the only complication noted was localized dry gangrene of skin and subcutaneous tissue where the injections had been too large or too close together. Colonel S. P. JAMES exhibited preparations of malariated mosquitoes showing ROSS's "black spores" in stomach-wall, thoracic muscles, and salivary glands. Dr. E. A. KELLERSBERGER sent a galaxy of photographs of interesting pathological phenomena from the Lomami District of Belgian Congo. Colonel Clayton LANE showed photomicrographs of curious effects of osmosis, cohesion, etc., observed in the manipulation of saline suspensions containing eggs of intestinal worms; also vegetable fibre, fish-bones, etc., having deceptive resemblance to specific worms, passed from the intestine. Dr. MANSON-BAHR demonstrated the effects of plasmochin on the gametocytes of Plasmodium; misshapen and disintegrating crescents; and even more striking effects upon gametocytes of *P. vivax*. Dr. A. ROBERTSON displayed under the microscope various stages in culture of *Trypanosoma cruzi*, and for comparison leptomonad forms from culture of *Leishmania donovani*. Dr. Dyce SHARP exhibited *Acanthocheilonema perstans* developing in *Culicoides austeni*. Dr. C. M. WENYON in behalf of Dr. NORRIE, of Calcutta, showed an exceptionally large (4x2x2 cm.) Rhinosporidium-polypus, and sections showing the parasite, *R. seeberi*, in all stages of development. Several demonstrations of laboratory apparatus were given.

A. A.

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## MISCELLANEOUS.

WELLINGTON (A. R.). **Panama. Health Conditions Past and Present. Report.**—46 pp. With 4 figs. 1927. Singapore: Fraser & Neave, Ltd., Printers.

An interesting account, by a health officer from the other end of the world, of present conditions in the Panama Canal Zone. The paper does not lend itself to summary, but a number of interesting and important points are quoted below.

" The actinic value of the sun's rays, as measured by the photographic meter, is only half that experienced in Malaya. Although the straw hat is the common head covering for all races, sunstroke is almost unknown and, when it does occur, the subject is almost always an alcoholic. It is not uncommon for white persons to go bare-headed for hours at a time and they suffer no ill effects."

" The Zone's area is four hundred and forty-eight square miles of which the Gatun Lake occupies nearly one half."

" The clay soil of the Alluvial flats is so dense, that spade cut drains preserve their formation and deteriorate very slowly from weathering. It is so non-porous that subsoil drains such as are used in Malaya cannot be employed. The so-called subsoil drains are really sub-rubble channels, for they consist of ditches having at their inverts concrete pipes, and filled to the surface with broken stone or rubble."

" During peace, the head of the Canal Zone is the Governor . . . He has autocratic powers and is responsible only to the President of the United States."

" The population has been concentrated in a few defined areas and the remainder of the Zone is devoid of humans."

" Anti-malaria control only extends to a radius of one mile beyond the limits of the Zone towns [7] and the cities of Panama and Colon."

" Filling being expensive is employed as little as possible.

" Oiling is done by sprays. The oil is ordinary liquid fuel, the same as is used in Malaya. To thin it to a spraying consistency, heat only is employed. At one time, thinning was done by mixing with the phenol larvicide manufactured locally. It was found that the soap of the larvicide interfered very materially with the spreading properties of the oil . . . It is only necessary to heat up to 70° C. The heating is done in steel kettles, where the oil is to be used."

" At one time a great deal of money was spent in keeping these edges [lakes and ponds] free from grass and reeds. Now they leave the vegetation alone and spray over it, or near it. It is said that the spreading property of the heated oil is such, that it finds its way between the stalks of grasses and reeds and kills the larvae harbouring there."

" Each lake is oiled once in ten days . . .One man rows the boat close to the shore while another sprays. The amount sprayed is insufficient to discolour the grasses, let alone kill them."

" Grass roots are not troublesome here, and they do not fill up the lumen of the pipes as so often happens in Malaya. Formerly, great use was made of earth channels which were oiled once in ten days ; now they are going in more and more for permanent drainage."

" Permanent drains are of two kinds ; concrete open channels and sub-rubble pipes."

" In spite of all that has been done in anti-mosquito work, the Canal Zone still continues to mosquito proof its houses."

" No private stables are allowed in the city [Colon]. There is one public stable, where stalls are rented by the horse owners. This institution is

kept carefully under control to prevent a fly nuisance developing. All manure is carted daily to the municipal compost pits, where it is stored and treated to kill any fly larvae which may be present and to prevent the deposit of eggs."

"The method of disposal [of refuse in Panama City] is dumping, followed by treatment until all danger of fly breeding is passed. There is an incinerator and it was used formerly. Once when it was out of action and dumping had to be resorted to, a determined effort was made to discover a method whereby the danger of fly propagation could be obviated. After a number of experiments had been tried a successful method was elaborated. It has everywhere been recognised that dumping would be ideal if fly-breeding could be eliminated, for it is cheaper than burning and it fills up low lying places and swamps without extra cost. The fly difficulty having been got over it was decided to close the incinerator and substitute dumping as a permanent measure.

"The Panama system is as follows :—

"The refuse is systematically dumped in a compact pile and the surfaces levelled. It is then given a good coating of warmed petroleum (liquid fuel) by means of a spray. The whole is then plastered with a layer of mud, several inches thick. Lastly the mud is sprayed with oil. Every day for eight days the mud covering is sprayed to kill any larvae which have escaped. By this time the heat of fermentation has killed all larvae in the pile and it is safe to leave it. In the daily refuse there is a considerable amount of grass matting such as is used in the East to pack goods. This is spread over the rubbish and sprayed. It acts as an extra protection and mud plastered on this makes a more durable covering. The sides of the pile have to be properly sloped and smoothed in order that the mud covering it shall endure. This is a very essential point for it is useless to treat the top and leave the sides open for the larvae to escape . . . It is recognised that the success of this method depends on Health Officer making a point of visiting daily. The dump is quite close to dwelling-houses and the method has been in use two years. There have been no complaints from the house occupiers, or from the hospitals, and a search for flies fails to find them."

"[The manure] is treated in exactly the same fashion as the garbage by being oiled and plastered with mud. The piling is repeated for 8 days." [The manure is eventually sold.]

"All houses are government property—private houses are not allowed in the Zone."

"Sanitary control is very strict and no nonsense is permitted."

J. F. C. H.

GIVEN (D. H. C.). **Health Organization on H.M. Naval Base, Singapore, and Results: with Comments on the Practice of Preventive Medicine seen during Tours in the Far East.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Feb. 25. Vol. 21. No. 5. pp. 344–362. With 2 charts.

This is a full consideration of the problem stated in the title and does not lend itself to condensation. There is an interesting description of the Dutch system (inaugurated by SCHÜFFNER) of plantation sanitation. It is evident that the importance of attending to sanitary matters at the beginning of such undertakings as the Singapore Naval Base has been realized and that no repetition of the Port Swettenham catastrophe will be allowed to occur.

J. F. C. H.

MARSHALL (J. F.). **Principles and Practice of Mosquito Control. Being a Handbook to the British Mosquito Control Institute.**—pp. viii+39. With 53 figs. & 1 map. Hayling Island, Hampshire. [2s. 6d.]

The booklet is a very useful guide to the subject treated. The term "water place" has been adopted for use in mosquito surveys in place of the cumbrous "potential breeding-place." [It would be helpful if the Institute would make a move with regard to the term paraffin. In this booklet the word seems to indicate lamp oil commonly called paraffin oil in Britain, kerosene in America, *pétrol* in French and *naphtha* in German. Paraffinum liquidum, lamp oil and motor spirit have all been employed in mosquito reduction and the rendering of these terms in various languages provides room for much confusion. SWELLENGREBEL and ROOK have suggested *vaseline liquide* for the first in French: the use of the terms liquid paraffin, kerosene and gasolene would help foreign readers of English to be sure what substance is meant.]

J. F. C. H.

MALAYAN MEDICAL JOURNAL. 1928. Mar. Vol. 3. No. 1. pp. 53–55. —**Methods and Mechanism of Mosquito Control.**

From a study of the work of others and some fresh experiments now reported, the following conclusions are recorded:

"1. The toxicity of oils increases with their volatility.

"2. The volatile portions contain the principle which produces the primary lethal effects.

"3. The lethal effects are produced by the penetration of the tracheal tissues by the volatile gases of the oil.

"4. In the heavier oils the action is simply suffocation or plugging of the tracheae by mechanical means.

"5. The water solubility of the oils appears to have no effect on their toxic properties.

"6. A pine oil and crude oil mixture is more toxic than either oil separately.

"7. One per cent. of castor oil in crude oil increases the spreading power of the oil film 25 times."

J. F. C. H.

DUNHAM (George C.). **Methods of reducing the Cost of Antimosquito Measures in the Control of Malaria.**—*Milit. Surgeon.* 1928. Jan. Vol. 62. No. 1. pp. 33–38. [Med. Field Service School, Carlisle Barracks, Pa.]

Dunham tackles the important problem of reducing the costs of malaria control. His own summary admirably states his conclusions.

"1. The cost of the antimosquito work in the control of malaria can be materially reduced if the control measures employed are based on the results of a properly conducted mosquito survey. The mosquito survey prevents the dispersion of effort, with the consequent waste of money and labor, which results from the employment of unguided and haphazard control procedures. The results of a mosquito survey indicate how a limited sum can be expended to the best advantage in the control of malaria carrying species of Anopheles and thus enhance the prospects of success in the control of malaria despite the financial restrictions.

" 2. The addition of from 20 to 25 per cent. of kerosene to waste motor oil will provide an effective oil larvacide at about one-fourth the cost of the crude oil and kerosene mixture.

" 3. A dust consisting of one part of Paris green in 100 parts of inert diluting dust, constitutes an effective larvacide for Anopheles larvae. In the control of Anopheles breeding places, the Paris green used to kill the larvae costs less than one-tenth as much as the crude oil-kerosene larvacide required to obtain the same results."

[Probably the last sentence is not *universally* true.]

J. F. C. H.

BOYD (J. E. M.). **Anti-Malarial Works and Improvements.**—*Jl. Roy. Army Med. Corps.* 1928. Apr. Vol. 50. No. 4. pp. 287–288.

This note arises from the success of the mosquito-proofing of soldiers' quarters reported by MUNRO (*ante*, p. 278) and referred to by RUTHERFORD (*Jl. R.A.M. Corps*, 1928, V. 50, No. 1, p. 76). The author says that a point needing " grave consideration " is " the elimination of the possibility of the execution of all schemes and works by local authorities, without reference to higher authority." From the context it appears that the authority contemplated is " sanitary experts at Simla." Examples are quoted of foolishly incomplete work—doors screened but not the fanlights over them, and so on. [It must be presumed that Major Boyd is right, but the civilian may be permitted some surprise that so simple a matter as the proper screening of soldiers' quarters cannot be properly attended to without guidance from the august " sanitary experts at Simla."]

J. F. C. H.

RUTHERFORD (N. J. C.). **Mosquito-Proofing of Barracks of British Troops in India.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1928. Apr. Vol. 50. No. 4. pp. 316–318.

Colonel Rutherford brings additional evidence of improved health following the screening of soldiers' quarters. He quotes from the *Report on the Health of the Army* for 1926. In that report screening is described as an effective but expensive method of malaria prevention, and it is suggested that in proportion as removal of troops from malarious stations during the dangerous months is effectively carried out, so the need for screening will be diminished. Colonel Rutherford evidently has doubts [and the reviewer shares them] as to its ever being possible effectively to carry out such a scheme of " cold storage." The " exigencies of the service " are always liable, and even likely, to upset such a scheme by just that small amount which will wreck its efficacy.

It is suggested that a calculation of the costs of paludism to the Government of India would perhaps reconcile those in the seats of the mighty to some preventive expenditure on measures proved and admitted to be effective, although expensive.

J. F. C. H.

CAWSTON (F. G.). **Mosquito-Proof Gutterings.**—*Jl. Roy. Army Med. Corps.* 1927. Dec. Vol. 49. No. 6. p. 441.

The gutters ordinarily used on roofs are half-round and a fall is given by tilting one end higher than the other, when fixing. Cawston recommends that the gutter itself should contain the slope, its upper

edge being fixed horizontally. For this purpose six foot lengths of sheet iron can be cut out with converging borders, two inches wider at one end than at the other, and can then be bent so that their edges are parallel, giving a slope of one inch in every six feet.

J. F. C. H.

BROUGHTON-ALCOCK (W.). **Thatched Buildings—a Problem in Malaria Prevention.**—*Proc. Roy. Soc. Med.* 1928. Jan. Vol. 21. No. 3. pp. 462–464 (Sect. Trop. Dis. & Parasit. pp. 16–18).

This short paper is based on the belief that the dangerous anopheles are those found hanging about in houses and outbuildings. Thatched roofs and thatched walls provide additional sheltering crevices, encouraging mosquitoes to lurk within and making it more difficult to catch or kill them. The author advocates replacement of thatch by corrugated iron " painted with white refrigerating paint."

J. F. C. H.

VLASSOV (J.). **On the Question of Mutual Relation between Bats and Mosquitoes.**—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. English summary pp. 260–261. [In Russian pp. 174–175.].

The author reports the co-existence in Transcaspia of mosquitoes and great numbers of bats (*Myotis myotis omari* Thom. and *Minopterus schreibersii pallidus* Thom.). Despite the nightly issue from a cave of " scores of thousands " of these bats, mosquitoes are a great nuisance and three of the author's companions contracted malaria.

J. F. C. H.

BRUMPT (E.). Rôle du poisson vivipare américain *Gambusia Holbrooki*, dans la lutte contre le paludisme en Corse. [**Rôle of** *Gambusia holbrooki* **in the Antimalarial Struggle in Corsica.**—*C. R. Acad. Sci.* 1928. Mar. 26. Vol. 186. No. 13. pp. 909–911. With 1 text fig.

In a footnote the author says that under the name *Gambusia affinis* three species are often included, namely *G. affinis, G. patruelis* and *G. holbrooki*. It is upon the last that he reports. The fish came from Italy, having been bred from a consignment sent originally from U.S.A. to Barcelona. They throve in canals, in which larval captures were reduced from some hundreds per square metre in 1926, to nil in 1927. As evidence that the fish were really responsible an interesting observation is noted. At a point of the canal where larvae were absent, five boats were tied up, four afloat but holding water and one half sunk. The four contained no fish but numerous anopheles and culex larvae ; the sunken boat contained several gambusia, but no larvae whatever.

J. F. C. H.

LEGENDRE (J.). Poissons larvivores de la Haute-Volta. Technique de l'emploi des poissons contre les maladies à moustiques. [**Larvivorous Fish of the Upper Volta.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 476–480. [18 refs.]

Legendre refers to his former work in Madagascar, in which he combined economic pisciculture with mosquito reduction. He lays down certain principles for the use of fish in combating malaria.

(*a*) Use edible fish. Native races may be sceptical about the need for destroying larvae but appreciate an additional food supply.

(*b*) Use fish of large size, whose numerous fry are a good substitute for small adult fish.

(*c*) In rice fields and the like, use fish which spawn in the summer—the mosquito breeding season.

(*d*) In stocking with fish, it is useful to use fish about to spawn.

(*e*) Use fish which stand transport well, and which have been trapped or netted—not those caught by hook.

(*f*) It is often helpful to use a stock tank from which fish are distributed.

J. F. C. H.

SELLA (Massimo). I pesci larvifagi e l'esperimento di campagna antimalarica con le Gambusie a Rovigno d'Istria. [**Larviphage Fish and Antimalarial Control with Gambusia in the Territory of Rovigno, Istria.**]—*Riv. di Malariologia.* 1927. Nov.–Dec. Vol. 6. No. 6. pp. 881–909. With 10 text figs. (1 map). [English summary pp. 1010–1011.]

Antimalaria experiments with Gambusia have been going on for 2 years, in an area of 300 square miles. The Anopheles ponds number more than 800, and are usually small. The fish stand frost well on a soft bottom in which they can burrow: they multiply rapidly within a few months, and a few individuals may live for two years; the young fish are the more voracious. There was a noticeable improvement in the number of primary cases of malaria in the first year after introduction of fish and still more in the second year. The results were as good in the area worked with Gambusia alone as in the area worked with Gambusia and with Paris green. The cost with Gambusia was about one-third the cost with Paris green. The foregoing is from the English summary.

A. Alcock.

MYERS (G. S.). [**An Analysis of the Genera of Neotropical Killifishes allied to** *Rivulus*.]—*Ann. & Mag. Nat. Hist.* 1927. Jan. Vol. 19. No. 109. pp. 115–129. [Summarized in *Rev. Applied Entom.* 1927. June. Vol. 15. Ser. B. Pt. 6. p. 101.]

"This is a systematic account of the fish of the Neo-tropical region belonging to the tribe Rivulini of the Poeciliid sub-family Fundulinae, including descriptions of new genera and species. These fish destroy mosquito larvae."

J. F. C. H.

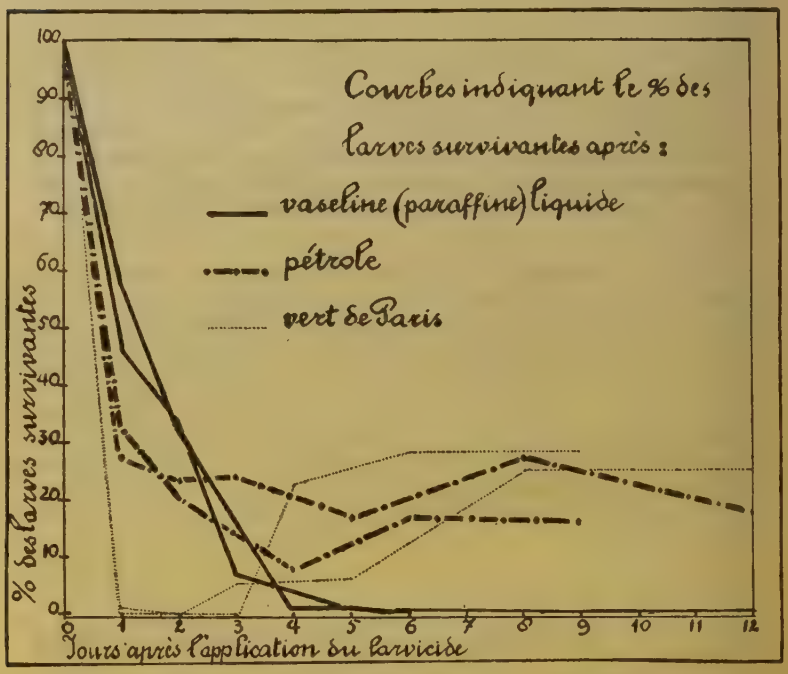
SWELLENGREBEL (N. H.) & DE ROOK. Effet comparé de quelques larvicides. [**Comparative Efficiency of Certain Larvicides.**]—*Bull. Soc. Path. Exot.* 1928. Feb. 8. Vol. 21. No. 2. pp. 109–112. With 1 text fig.

The authors continue their comparisons of larvicides (see *Bulletin of Hygiene.* 1927. Vol. 2. p. 585). Some criticism has been aimed at their use of a smaller quantity of liquid paraffin than is employed when

kerosene is the agent applied, a proceeding held to be illogical since liquid paraffin kills larvae only by suffocation, while kerosene has a toxic action to supplement its asphyxiating properties.

Experiments have been made, using various agents, on different but comparable breeding areas and, in addition, the effects were noted when the amount of kerosene employed was equal to, double, and four times the quantity of liquid paraffin.

The results support the contention that a dosage of liquid paraffin adequate to destroy all larvae was insufficient when kerosene was the




Curves showing the percentage of larvae surviving after treatment with liquid paraffin, kerosene, and Paris green.

[Reproduced from the *Bulletin de la Société de Pathologie Exotique.*]

larvicide. In the first two days kerosene appeared to be superior, but at later stages it was less effective and lost its action before all larvae were killed.

The authors' explanation is that the vegetation in the places treated impeded the spread of both larvicides, but, while the effect of the liquid paraffin was only delayed, that of the kerosene was partially negatived by volatilization taking place before the spread was complete.

The comparative results of the use of the two oils and Paris green are seen in the graph reproduced.

The authors have rejected the name *paraffine liquide* in favour of *vaseline liquide* to avoid the confusion which arises from the colloquial English use of the word paraffin. [See note in summary of MARSHALL, *ante*. p. 912.]

J. F. C. H.

BARBER (M. A.) & KOMP (W. H. W.). **Some Tests of the Larvicide "Stoxal".**—*Public Health Rep.* 1927. Aug. 5. Vol. 42. No. 31. pp. 1997–2004. [3 refs.]

ROUBAUD's work with "Stoxal" has been referred to in *Bulletin of Hygiene*. 1927. Vol. 2. p. 581. The present authors describe carefully conducted and controlled laboratory and field experiments to test the value of the new larvicide.

In field experiments against anopheles "Stoxal" distributed at 27 lb. per acre gave an efficiency of 85 per cent.; (this was the most favourable result obtained). Smaller amounts were much less efficient. Three pounds of Paris green in 300 lb. of road dust gave efficiency of nearly 100 per cent. Pure trioxymethylene (Merck)—the active substance of "Stoxal"—diluted with two volumes of dust and applied at a rate of 10·2 lb. of trioxymethelene per acre gave an efficiency of nearly 90 per cent.

The authors conclude that it is evident that the "minimum active dose" of ¼ lb. to 2½ acres as described in the directions for the use of "Stoxal" cannot be expected to destroy a high percentage of larvae and "in the case of *Anopheles*, wherever a dust larvicide is indicated, Paris green is certainly far cheaper than stoxal." For culicines oil or fish will generally be more economical; even when this is not the case, commercial trioxymethylene diluted with some inexpensive dust, as originally recommended by ROUBAUD, will be much cheaper than and fully as efficient as "Stoxal."

J. F. C. H.

RYLES (C. S.) & MAJUMDER (B. C.). **The Use of Petrol as a Larvicide in Wells, Tanks and Similar Collections of Water used for Drinking or Domestic Purposes.**—*Malayan Med. Jl.* 1927. Dec. Vol. 2. No. 4. p. 144.

In preliminary laboratory experiments it was found that small quantities of gasolene, when dropped on a water surface, stupefied culicine larvae, but killed many of the anophelines. Stirring increased the efficacy of the gasolene. In the laboratory 2 drams to 95 sq. in. surface produced unfailing results. All signs of the gasolene had gone in 1 hour and all larvae (culex and anopheles) were dead.

Experiments were next made on wells and tanks with and without vegetation. Vegetation was killed by the gasolene and so were all kinds of mosquito larvae with rapidity and certainty when the application was made at a rate of 24 ounces per 80 sq. ft. at a cost of 15 cents. The convenient note is added that a whisky bottle holds 24 ounces. Stirring is recommended, but a spray may be used instead.

Many observers are stated to have confirmed the authors' finding that after 3 hours no trace of the gasolene is detectable by smell, taste or chemical examination.

It is suggested that wells be treated in the evening; by morning the water would show no trace of the application.

J. F. C. H.

MATHESON (Robert) & HINMAN (E. H.). **A New Larvicide for Mosquitoes.**—*Amer. Jl. Hyg.* 1928. Mar. Vol. 8. No. 2. pp. 293–296. [1 ref.] [New York State College of Agric., Cornell Univ., Ithaca, N.Y.]

Experiments here tabulated show that solutions of borax of not less than 1·5 gm. per litre of water are an efficient larvicide for mosquitoes. Such concentrations remain effective for a long time—at least six weeks.

A. Alcock.

CHALAM (B. S.). **The Possibility of "Paris Green" as an Anopheles Larvicide.**—*Indian Jl. Med. Res.* 1927. Apr. Vol. 14. No. 4. pp. 867–874. With 2 text figs. & 3 figs. on 1 plate. [4 refs.]

The author recounts his experiments with Paris green. To an area of about half-an-acre of brackish water free of vegetation or "floatage" and giving from 5 to 25 anopheles larvae at a dip, about 6½ ounces was applied; to another area of rather more than half an acre of brackish water with mangrove "floatage," yielding from 5 to 18 larvae at a dip, about 8 ounces; to about 133 square yards of ditch water with weedy selvedge, giving from 3 to 50 larvae at a dip, about 200 grains; to an iron cistern containing about 287 gallons of water and about 200 larvae, 5 grains; to a masonry garden-cistern of about 430 gallons capacity and harbouring about 150 larvae, 6 grains; as well as to a pond having an area of about an acre and a dense covering of green algae and containing large numbers of larvae, an unspecified quantity. In every case the anopheles larvae were killed off after the treatment with Paris green. The larvicide was diluted and was either thrown on the water by hand or applied by a bellows. Ordinary road dust, coke dust, sawdust, fine sand, or flour may be used as diluents; but they must be quite dry, or they sink and are useless. 1 part of Paris green was mixed with 100 parts of the diluent. The only precaution necessary in use is to keep to windward of the larvicide when applying it. No accidents occurred.

A. Alcock.

DALAL (P. A.) & MADON (E. E.). **A New Diluent for Paris Green.**—*Indian Med. Gaz.* 1927. Oct. Vol. 62. No. 10. pp. 554–555.

Tanks of various kinds form breeding places for anopheles in Bombay. For the application of Paris green, ordinary road dust was not very satisfactory because the disturbance of the water surface caused by wind or by the incoming flow made the dust and larvicide sink too quickly. Various experiments were made.

"(*a*) Cork powder was suitable but too expensive;

"(*b*) Sawdust had a tendency to sink after a short time and form a layer at the bottom which had to be cleaned often;

"(*c*) Fine road-dust sinks too quickly and does not withstand agitation or wind action;

"(*d*) Flue-dust—the very fine powder obtained after cleaning the boiler flues—was better in floating qualities, and worked quite satisfactorily in destroying larvae.

"But the best material for the purpose in view proved to be

" (*e*) French chalk. It forms a very thin even film on the surface, which lasts for about four days if the water is undisturbed as in the case of a closed tank, and almost refuses to be drowned by agitation."

The chalk, which is finely powdered magnesium silicate, can be bought in a crude form (steatite) in Indian bazaars under the name of *sangjiru* and when crushed and ground in a mortar is cheaper than the imported powder.

J. F. C. H.

i. HERRMANN (O.), KOLOSSOW (J.) & LIPIN (N.). Ist Parisergrün ein besseres Anopheles-Larvizid als Naphtha oder Petroleum ? [**Is Paris Green a Better Larvicide than Kerosene or Liquid Paraffin?**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1928. Mar. Vol. 32. No. 3. pp. 140–143. [9 refs.]

ii. DE ROOK (H.) & SWELLENGREBEL (N. H.). Bemerkung zu der Arbeit Hermanns, Kolossows und Lipins: Ist Parisergrün ein besseres Anopheles-Larvizid als Naphtha oder Petroleum, erschienen 1928 im Heft 3, Bd. 32, S. 140–143 dieser Zeitschrift.—*Ibid.* May. No. 5. p. 265.

i. The authors report experiments on the comparative value of liquid paraffin, kerosene and Paris green as larvicides and emphasize the limitations of Paris green, notably its failure to destroy the larvae of culicine mosquitoes and the eggs or pupae of anopheles, and the short duration of the effect of one application.

They suggest that the proper sphere of Paris green is provided by such conditions as render neither kerosene nor liquid paraffin suitable, instancing such waters as are required for drinking purposes or where fish life must be considered.

In the course of their argument the authors say : " That Paris green does not satisfy all workers is evident from the writings of ROOK and SWELLENGREBEL, who give liquid paraffin preference over Paris green."

(ii) Rook and Swellengrebel admit that conditions in Holland led them to prefer the liquid paraffin except for big canals, but point out that in these, as stated in their paper, Paris green gave 83 per cent. reduction of larvae despite presence of rushes, while liquid paraffin gave no better figure than 65 per cent. [Probably no experienced worker would express an absolute preference for one larvicide or another, it being as true in mosquito destruction as elsewhere that circumstances alter cases.]

J. F. C. H.

SCHUURMAN (C. J.) & HUININK (A. Schuurman-Ten Bokkel). Proefnemingen met Parijsch groen ter vernietiging van Anopheleslarven. [**Experiments with Paris Green to test its Effect as a Larvicide.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1928. Vol. 68. No. 2. pp. 280–292. [7 refs.] [Med. Lab., Weltevreden.]

These experiments were carried out in the medical laboratory in Weltevreden (Java) and in the field (fish ponds along the coast near Batavia). In the laboratory experiments the powder was mixed with cement, magnesia, acid clay, and pounded " red earth." This red earth can be had in any quantities, it is cheap and effective and so it is the diluting material for practical use in those parts. The dilution (1 per cent.) and quantities (10 cc. of the diluted material per sq. in.)

used, were the customary ones. It was found that the youngest instars were not killed. At any rate this is mentioned incidentally in the description of one experiment, although, in this case, it is not clear whether the young larvae, found after 38 hours, had hatched from ova present at the time of the dusting process, or whether they had survived this process in the shape of larvae. The larvicidal effect of Stoxal, diluted with magnesia, sand or acid clay, in quantities of 10 and 100 milligrammes per sq. m., proved unsatisfactory, especially when the test was made in a large tank : the mortality after 24 hours remaining under 40 per cent. (50 milligrammes per sq. m.), whereas Paris green, used in the same quantities and under the identical conditions, caused a mortality of 99 per cent.

The field experiments were carried out by applying the Paris green to the surface of one of the numerous littoral fish-ponds, containing brackish water and overgrown with floating and rooted weeds. It contained an average of 70 larvae per dip [species not stated, probably *A. rossi*, considering the time of the year : November 30–December 1], on a surface of 214 sq. m., requiring 2,568 litres of the mixture of red earth and 1 per cent. Paris green, distributed by a hand blower. The result after 24 hours showed 46 living larvae [size not stated], and 4 pupae in 160 dips. In one corner only, where the wind had failed to carry the powder in sufficient quantities, there still remained 293 larvae per dip.

With regard to costs, the author states that they are fl. 1·24 (about 2s. 1d.) for parisgreening 7,000 sq. m., against fl. 4·25 (7s. 1d.) for oiling the same surface (the author takes it that 1 litre of oil is sufficient for 100 sq. m.). To deal with the whole breeding area constituted by the Ludlowi fishponds in the vicinity of the town of Batavia, would require an annual expenditure of fl. 4,500 (£3,750) when using Paris green for 9 months (excepting the off-season with respect to Ludlowi, *i.e.*, October–December).

N. H. Swellengrebel.

LISCHETTI (A. B.). [Experiencias sobre la acción de substancias tóxicas sobre mosquitos adultos.] [**Experiments on the Action of Toxic Substances on Adult Mosquitoes.**]—*Rev. Soc. ent. argent.* Buenos Aires. 1926. Dec. 31. Vol. 1. No. 2. pp. 29–32. [Summarized in *Rev. Applied Entom.* 1927. June. Vol. 15. Ser. B. Pt. 6. p. 112.]

" At short distances mosquitoes become aware of the presence of a honey-bait, and the females feed on the honey without waiting for an opportunity to suck blood. Poisoned females do not succeed in ovipositing. Mosquitoes, attracted by a caged guineapig, fed on poisoned honey smeared on the gauze of the cage."

J. F. C. H.

LISCHETTI (A. B.). [**The Poisoning of Adult Anophelines.**]—*Soc. Argentina de Patol. Regional del Norte ; Segunda Réunion realizada en Salta.* 1926. pp. 228–242. [Summarized in *Rev. Applied Entom.* 1927. Apr. Vol. 15. Ser. B. Pt. 4. pp. 72–73.]

" Experiments with poison-baits against adult Anophelines have been made in Argentina, the material used being honey mixed with mercury bichloride, boric acid, arsenious anhydride, potassium arsenate, potassium arsenite or potassium cyanide. Potassium arsenite proved the most satisfactory, as potassium cyanide, though the most active, soon loses its toxicity."

J. F. C. H.

BALFOUR (Andrew). **An Address on the Education of Medical Officers for Service in the Tropics. Delivered at the International Continuation Course of the League of Nations, Nov. 24th, 1927.**—*Lancet.* 1928. Jan. 14 & 21. pp. 63–67 ; 117–122.

Two lectures given at the International Continuation Course of the League of Nations, the first headed tropical medicine, the second tropical hygiene. They will be widely read, and do not need detailed treatment here. It is interesting to find Dr. Balfour advocating a short course of study for students who have never been to the tropics, " during which essentials can be hammered into them."

" After some preliminary and general instruction, the idea is to take an important disease and to group round it, as it were, the teaching which is required for its full elucidation, considering it, therefore, from the purely clinical side, from the laboratory standpoint, and dealing with its relations to those sciences, haematology, protozoology, and entomology, with which it has close connexions."

" I am inclined to think that a couple of capable teachers, one on the clinical side, one on the laboratory side (and the latter, I admit, will not be easily found), with, of course, assistants and demonstrators, would be sufficient to ground the students properly, keeping, as I say, to essentials but not losing sight of the larger issues and forecasting, as it were, the longer and fuller course to which it is hoped the student will return after a sojourn in the tropics."

A. G. B.

NOCHT (Bernardt). **Present Position of Chemotherapy from the Clinical Standpoint.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Feb. 25. Vol. 21. No. 5. pp. 397–408.

This was a lecture given at a Continuation Course in Public Health, organized by the League of Nations. It forms a useful review of its subject. Professor Nocht defines chemotherapy as " aetiologic therapy with synthetic chemicals," which leaves outside the definition symptomatic therapy and natural pharmaceutical products, but he does not exclude quinine. He follows EHRLICH in distinguishing between organotropy and parasitotropy, but notes that parasiticidal action is rare, the usual effect being rather parasititoxic, the impairment of motility or a prohibition of multiplication of the parasites.

He considers the mechanism of the action of quinine in malaria and finds that its effect is greater when the patients have developed some self immunizing power : " the effect of quinine is much better when administered after a certain number of attacks of fever." [Most authorities believe that the prospect of eradication of infection is greater the earlier quinine is given and greatest before the occurrence of relapse].

Another mode of action of chemotherapy is purely stimulant, as by stimulation of the reticulo-endothelial system ; chemotherapeutic substances which act thus must be given very cautiously in small or very moderate dosage.

He divides the outstanding chemotherapeutic substances into six groups, thus :—

" (1) Aniline dye stuffs and their derivatives—methylene blue, gentian violet, trypan blue and trypaflavin, ' Bayer 205,' and other compounds.

" (2) Arsenic compounds—salvarsan and its derivatives, tryparsamide, stovarsol.

"(3) Antimony compounds—tartrated antimony, stibenyl, stibosan, antimosan.

"(4) Metallic compounds—gold, silver, mercury, bismuth, and copper compounds.

"(5) Quinine and its derivatives and relations.

"(6) Different curatives, for instance, the derivatives of chaulmoogra oil, organic iodine, compounds like yatren and others."

Emetine, he says, cannot be called a true chemotherapeutic compound.

In the consideration of the chemotherapy of bacterial infections he distinguishes septic infections, pneumococcal infections and others. In the third group come the metallic therapy of tuberculosis, the treatment of leprosy with chaulmoogra oils and gold, and that of venereal granuloma with antimony compounds. He thinks that gold compounds act as general stimulants rather than directly.

He sums up the chemotherapy of bacterial infections by saying that the only example of really quick and reliable curative influence is that of antimony on venereal granuloma, but whether the capsulated micro-organism which is found "is a real bacterium is not quite certain."

The spirochaetal and trypanosomal infections are the classical territory of chemotherapy, the best remedies for sleeping sickness at present being Bayer 205, tryparsamide and antimony. Of Bayer 205 he writes :—

"Unfortunately the best method of application of 'Bayer 205' in man seems not to be generally known abroad. It must not be given at too long intervals, as for instance only once in a week. We have had excellent results in all cases treated in Hamburg by beginning with daily doses of 1 g. for about four or five days and then continuing with weekly doses. In cattle infections with trypanosomes, the results of 'Bayer 205' are not yet definite in Africa, but in South America it has given excellent results against mal de Caderas, and in Russia—Kirgise [sic] Steppes—against a camel disease—surra. Thousands of camels have been cured. The Russian authorities report that it is due entirely to 'Bayer 205' that camels have lived and bred in the Kirgise Steppes and have been preserved."

Tryparsamide was originally prepared and tested by EHRLICH.* Antimony tartrate was first used by PLIMMER and J. D. THOMSON† (1907). Finally Dr. Nocht speaks very highly of yatren—for amoebic dysentery in every phase, for chronic bacillary dysentery and for chronic ulcerative colitis.

A. G. B.

CLEVELAND (L. R.). **Some Problems which may be studied by Oxygenation.**—*Science.* 1926. Feb. 5. Vol. 63. No. 1623. pp. 168–170. [Med. School, Harvard Univ., Boston, Mass.]

The author's studies on the toxic effect of oxygen pressure upon protozoa, bacteria, moulds, and yeasts lead him here to speculate on the multifarious scientific and economic possibilities of the application of this process of oxygenation. Among those already tried by him is the freeing of insects from their protozoon and other parasites and symbiotes for experimental investigations (*cf.* this *Bulletin*, Vol. 22,

* Professor NOCHT has withdrawn this statement. Tryparsamide was originally prepared at the Rockefeller Institute and there tested (see this *Bulletin*, Vol. 15, p. 390).

† Not PLIMMER and BRADFORD, as is stated, probably by a slip, in the text.

pp. 835, 836); this is applicable to the solution of many problems of general biological importance. Among economic possibilities he suggests the freeing of useful insects, fishes, and plants from their parasites; determining the nature of ambiguous viruses of plants, and the rôle of insect transmitters of disease; killing protozoa for immunization purposes; sterilizing culture media; destroying insects in grain and nuts, and the preservation and storage of liquids.

A. Alcock.

COOPER (G. F.). **Infant Feeding in the Tropics.**—*U.S. Nav. Med. Bull.* 1928. Jan. Vol. 26. No. 1. pp. 79–81.

The author after 10 years of observation finds that in Haiti, where it is not possible to obtain fresh cow's milk of good quality, babies do as well, or better, on condensed milk. He gives detailed instructions for condensed milk feedings; it is made up with oatmeal water and supplemented by orange juice and cod-liver oil.

A. G. B.

MEGAW (J. W. D.) & MULLICK (M. N.). **Some Laboratory Findings and their Significance.**—*Indian Med. Gaz.* 1928. Mar. Vol. 63. No. 3. pp. 113–117.

The analysis is made of laboratory findings in 400 unselected patients, admitted to the hospital of the Calcutta School of Tropical Medicine and Hygiene. As all patients are subjected to these routine examinations, whatever may be the disease they are suffering from, the series forms an excellent control, which would be capable of application at any time to results obtained in a particular disease. It is one of the great difficulties in dealing with hospital statistics that it is necessary to know what occurs in the class of patients which attends the hospital, as well as the general population, if the significance of special findings is to be established. The authors emphasize the fact that the labour involved in carrying out laboratory investigation as a uniform routine is repaid by the additional light which is sometimes thrown upon the clinical aspects of a case. And yet they would not elevate the laboratory conclusion into a final judgment. That is reserved for the clinician, preferably in actual consultation with the laboratory expert. The present series gave the results that:—

(1) A positive agglutination reaction with the Flexner or Shiga bacillus is suggestive of the previous occurrence of a dysentery infection.

(2) A positive finding in low dilution in dysentery cannot be accepted as meaning that the attack is due to the bacillus which is agglutinated.

(3) A negative finding does not exclude dysentery infection.

(4) Agglutination tests cannot be relied on for the discovery of carriers in dysentery.

(5) Positive agglutination reaction to the enteric group in fairly high dilutions is so common, that it is of little value as evidence of the existence of the disease in Bengal, even in persons who have never been inoculated.

(6) The findings for the enteric group are very suggestive of the existence of widespread infection of the population in childhood.

(7) Only 7 per cent. of patients showed cysts of *Entamoeba histolytica*.

(8) Wassermann reactions were, strongly positive 6·1 per cent., moderately positive 16·4 per cent., doubtful 8·7 per cent. and negative 68·7 per cent.

(9) *Microfilaria bancrofti* infection was found in 6·75 per cent.

(10) Hookworm ova showed in the stools in about 27·6 per cent. of unselected cases in Calcutta.

W. F. Harvey.

ARATHOON. Etude sur la morbidité de 10e régiment de tirailleurs sénégalais. (Extrait du rapport annuel pour 1926). [**Disease Incidence in the 10th Regiment of Senegalese: from the Report for 1926.**]—*Ann. de Méd. et de Pharm. Colon.* 1927. Oct.–Nov.–Dec. Vol. 25. No. 4. pp. 458–464.

In February, 1926, some months after the return to Tunis of a battalion sent to Morocco, some six natives and three Europeans attended hospital for ulcers, ranging from the diameter of a 50 centime piece to that of a two franc piece, purulent, with irregular, granular face and steep edges, with base indurated and margin inflamed; they were situated on the back of the hand and forearm, face (forehead. lip, ear) and in one instance the leg. Most of the patients had more than one. Afterwards other cases were seen, in all 5 Europeans and 14 natives. Scrapings of the ulcers were examined under the microscope and in 5 instances Leishmania were found; the author believes all the cases to have been dermal leishmaniasis. All came from three companies which had been stationed for a long time at Ain Maatouf, 80 kilometres east of Fez, already known to be a focus of this infection. Various methods of treatment were followed and all resulted in cure.

Two cases of bilharziasis were admitted to hospital, and examination at the Pasteur Institute revealed the fact that of one company 30 per cent. were infected [species or site not mentioned]. This is important, because bullinus molluscs are found in at least one part of Tunis. Strict measures will be necessary to prevent the establishment of bilharziasis in Tunis.

A. G. B.

GORDON (G. A. C.). **The Health of the European Child in Singapore and Malaya.**—*Jl. Trop. Med. & Hyg.* 1927. Dec. 15. Vol. 30. No. 24. pp. 313–319. [13 refs.] Also in *Malayan Med. Jl.* 1928. Mar. Vol. 3. No. 1. pp. 32–40. [13 refs.]

The conclusion of this interesting contribution to a subject of increasing importance is that European children could be kept longer in Malaya than is now the custom, to the age of nine or, with hill-stations and "leaves" to Europe, to the age of puberty without physical or mental deterioration. Singapore has a humidity constantly between 80 and 90 per cent., a heavy and evenly distributed rainfall and a mean temperature of 80° F. At present most children are sent to England at the age of 5, but the author notes that there are a number of families of European stock, born and brought up in the tropics, who though not so robust or virile as the European immigrant, compare favourably with the indigenous population. He discusses the physical and mental development, moral and educational difficulties and points of infant and child welfare in the tropics. Unsweetened condensed milk

is regarded as a valuable food for children and the consumption of desiccated milk rises steadily; fresh cow's milk is not considered a suitable food for children in this country. Dietary, clothing and exercise are considered—in general European children do not get sufficient exercise and are kept too much in the house—and, lastly, common debilitating ailments and their prevention.

A. G. B.

HUPPENBAUER (C. B.). Beitrag zur Frage der Tropendienstfähigkeit. [**Fitness for Tropical Service.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg Univ.* 1927. Vol. 26. (D., Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 210–219. [8 refs.]

In this brochure the author deals generally with the question of the examination of candidates for service in tropical countries, pointing out the necessity for a more detailed case history and examination than for life insurance. Each candidate should be considered in reference to the particular country to which he is going and the environment which he will there meet. The teeth, the organs of the special senses and in women the generative organs must receive great attention, and "anyone who does not care for his skin in a proper manner is not fit to go to a hot country." The "Quinine Test" is considered essential, *i.e.*, a candidate must be shown to be able to take full doses of quinine before leaving Europe. [This paper contains no new ideas.]

H. S. Stannus.

RUBINSTEIN (P. L.). Ueber noch unbekannte Funktionen des retikulo-endothelialen Systems. II. Der Einfluss des retikulo-endothelialen Systems auf den prophylaktischen Effekt des Stovarsolans Spirochäten gegenüber. [**On Some Hitherto Unrecognized Properties of the R.-E. System. II. The Influence of the R.-E. System on the Prophylactic Effect of Stovarsolan in Spirochaete Infections.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1928. Mar. 6. Vol. 55. No. 1–2. pp. 107–117. With 2 text figs. [6 refs.] [Microb. Research Inst., Education Commissariat, R.S.F.S.R., Moscow.]

Rubinstein has investigated the influence of (1) splenectomy and (2) splenectomy and blockade, on the prophylactic action of stovarsolan in experimental recurrens infection of mice. The prophylactic method of test was rendered necessary owing to the desirability of excluding complicating factors arising from antibody-development in the ordinary therapeutic test. The procedure employed was usually as follows: The spleen was removed 24 hours before infection with *S. obermeieri*. Three hours after infection, stovarsolan was given *per os* and also on the two following days. The results are given *in extenso* in five tables, but they may be shortly summarized thus:

| | Percentage sterilized. | Percentage mortality |
|---|---|---|
| Mice with intact R.E. ... ... ... | 92 | 0 |
| " Blockaded " mice ... ... ... | 57·5 | 12·7 |
| Splenectomized mice ... ... ... | 0 | 78·4 |
| Splenectomized and blockaded mice ... | 0 | 73·5 |

The author concludes that the prophylactic effect of the remedy depends on the intactness of the R.E. system. If this is interfered with in any way the sterilization rate falls and the case mortality rises.

J. C. G. Ledingham.

RUBINSTEIN (P. L.). Ueber ein bisher noch unbekannte Funktion des retikulo-endothelialen Systems. III. Die Abhängigkeit der Chemotherapie und Chemoprophylaxe von der Blockierung des retikulo-endothelialen Apparates. [**The Influence of Blockade of the R.E. System on Chemotherapeutic Efficiency.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1928. July 20. Vol. 57. No. 1–2. pp. 107–129. [7 refs.] [Microbiol. Research Inst., Education Commissariat R.S.F.S.R., Moscow.]

This paper contains a further contribution from the Moscow Laboratory directed by Prof. KRITSCHEWSKI on the influence exerted by interferences with the R.-E. system on the efficacy of chemotherapeutic substances. Mice were infected with trypanosomes (*T. equiperdum* and *T. suaru*) and the chemicals tested were atoxyl, germanin, trypanrot, tryparosan, antimony tartrate, and trypaflavin. The main object of the new series of experiments was to ascertain the influence of blockade alone (5 per cent. sol. of sugar of iron) as contrasted with that of splenectomy alone and of splenectomy *plus* blockade. The experimental results are displayed in eleven tables and in each experiment normal control mice were tested in parallel. In a few of the experiments the drugs employed did not prevent the appearance of trypanosomes in the blood and death of the mice within the period of observation, generally one month, but, as a rule, the mortality from trypanosome infection of the treated splenectomized animals, and of those which were both splenectomized and blockaded, was in the neighbourhood of 90 per cent. If one may legitimately sum the results of all the eleven experiments in order to give the reader an indication of the comparative mortality statistics in all four series, they work out as follows :—Splenectomized animals : No. used 73, mortality 92 per cent. Splenectomized and blockaded animals : No. used 82, mortality 94 per cent. Blockaded animals : No. used 92, mortality 55 per cent. Normal animals : No. used 90, mortality 41 per cent. The general result is clear that blockade alone interferes but slightly with the efficacy of the drug, whereas splenectomy renders the drug practically ineffective. The addition of blockade to splenectomy makes little difference.

J. C. G. Ledingham.

MACKERRAS (I. M.). **Tick Paralysis in Man in Australia.**—*Rep. of Director-General of Pub. Health New South Wales for Year 1926.* pp. 168–169. [12 refs.]

This is a resumé of the subject of tick-paralysis largely informed by the discoveries of Clunies Ross, who furnished the experimental proof that in animals the disease is caused by the toxic saliva of the adult female of *Ixodes holocyclus*, and by her only when, as she approaches a state of repletion, her salivary glands become grossly enlarged and their secretions fully toxic. [The work of Clunies Ross has already been noticed in this *Bulletin*, Vol. 24, p. 489]. It is probable that in man

also the adult female of *Ixodes holocyclus* is always the causative agent; all the recorded cases of tick-paralysis fall within the limits of its distribution. No age seems to be exempt, but the disease is more frequent and more serious in children than in adults. The clinical symptoms are those of a progressive motor paralysis, of very varying intensity, ending within a few days either in complete recovery or in death, death in many cases being by paralysis of respiration. The symptoms are here described in great detail. Clunies Ross's evidence suggests that the tick-venom has a special affinity for the motor cells of the spinal cord and the cranial nerve ganglia. Beyond removal of the tick no specific treatment seems to have been considered.

A. Alcock.

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VON BÁNSZKY (L.) & KREMER (W.). Allergische Reaktion bei Milbenüberempfindlichkeit.—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1928. Mar. 6. Vol. 55. No. 1-2. pp. 102–106. [3 refs.] [Pharmaco-Therap. Inst., Univ., Leyden.] [v. this *Bulletin*, Vol. 20, p. 473.]

BOSE (J. P.). A Simplified Method for Estimation of Sugar in the Blood.—*Indian Med. Gaz.* 1928. Feb. Vol. 63. No. 2. pp. 72–76. With 1 coloured plate.

FEILER (Marie). Ueber die Chininwirkung auf die Tierzelle. I. Mitteilung.—*Arch. f. Protistenkunde.* 1927. Nov. 4. Vol. 59. No. 3. pp. 562–581. With 9 text figs. [37 refs.]. [Zool. Inst., German Univ., Prague.]

RICOU (J. D.). Contribution à l'étude de la vaccination préopératoire.—*Bull. Soc. Path. Exot.* 1928. Mar. 14. Vol. 21. No. 3. pp. 260–266. [Main Hosp., Dakar.]

RUSSO. Etude sur les conditions d'organisation d'un service hydrologique dans les colonies et pays de protectorat et en particulier au Maroc.—*Rev. Méd. et Hyg. Trop.* 1928. Mar.–Apr. Vol. 20. No. 2. pp. 41–44.

TILMANT (Jules). Les dispensaires ruraux de la Province Orientale (Congo).—*Bruxelles-Méd.* 1928. Apr. 15. Vol. 8. No. 24. pp. dcclvii–dcclxiii.

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## REVIEWS AND NOTICES.

BRAHMACHARI (Upendranath). [K.-I.-H. (Gold), Rai Bahadur, M.A., M.D., Ph.D., etc.] **A Treatise on Kala Azar.** [Translated from the Author's Treatise on Kala-Azar in German in Professor Dr. Carl Mense's Handbuch der Tropenkrankheiten, Vol. IV, 1926, thoroughly revised and considerably enlarged.]—pp. xv+252. With 39 text figs., frontispiece & 12 plates (7 coloured). 1928. London: John Bale, Sons & Danielsson, Ltd., 83–91, Great Titchfield Street, W. 1. [21s.]

The Indian Research Fund Association is a very important agent for the development of medical research in India. In recent years, amongst its many activities, it has inaugurated investigations on the transmission and specific treatment of kala azar. Research on the latter aspect was conducted for the Association by Dr. Brahmachari at the Campbell Hospital, Calcutta, where he worked for many years. The combination of clinical and laboratory facilities in this well-managed hospital afforded unique conditions for research on the treatment of kala azar, and the author made full use of his opportunities. The results of his researches are embodied in the present volume, which is based upon the chapter written by Brahmachari for the fourth volume of Mense's *Handbuch der Tropenkrankheiten* published in 1926.

The book is divided into 17 chapters with 3 appendices. Chapter I deals with the history, geographical distribution and epidemiology of kala azar. Then follow three chapters on etiology and inoculation experiments. The next two are concerned with the transmission of the disease. In chapter VII the relation of canine to human leishmaniasis is discussed. The next chapter is devoted to herpetomoniasis and leishmaniasis. Thereafter in chapters IX to XV the symptomatology, complications, prognosis, diagnosis, pathology and treatment of kala azar are considered in detail. Chapter XVI deals with dermal leishmaniasis. Finally, in chapter XVII the prophylaxis of the disease in India and the Mediterranean countries is discussed. There is a very full bibliography with about 2,000 references and an index of authors and subjects.

The author considers that endemicity forms a special feature of kala azar and states that DONOVAN doubted the possibility of an epidemic outburst. Brahmachari concluded from clinical and statistical evidence that the old Burdwan fever (1854–1875) was mostly of malarial origin. ROGERS, on the other hand, held that this fever was an epidemic of kala azar. The author sees no reason to separate the Indian from the Mediterranean leishmaniasis.

Recent work on the rôle of the sandfly in the transmission of kala azar is clearly stated. He considers that the discovery of *Phlebotomous argentipes* in the city of Bombay, from which place no undoubted case of kala azar has been reported, goes against the possibility of the transmission of kala azar by this sandfly.

As would be expected, the *pièce de résistance* of the book is the chapter on treatment. A full history of the discovery by the author of urea stibamine is given. This drug has been now largely used in India for the treatment of kala azar aad has proved its value for the purpose. The only drawback to its use on a large scale is its comparatively high cost, but this may be reduced in time. In discussing treatment more stress might have been laid on the importance of dealing, in the first place, with other parasites, which the patient may harbour, for example, hookworm, etc. Possibly some of the " resistant " cases might yield more readily to specific treatment if this point was attended to.

A good account of the important skin lesion called " dermal leishmanoid " is given, well illustrated with coloured plates and microphotographs.

In the appendices laboratory methods employed in the diagnosis of kala azar are given in full detail.

A few misprints have been noted: thus, on page 119, the dose of urea stibamine is stated to be 0·05 to 1 gm.; the latter figure should be 0·1 gm.; and, on page 132, this error is repeated. The word "ancylostoma" is spelt throughout with a "k," which is not the present accepted spelling. These misprints should be corrected in future editions.

The author and the publishers are to be congratulated on having produced a clearly written, well illustrated and valuable monograph on a very important disease. The book can be confidently recommended to all medical men in the tropics and to others interested in the subject of kala azar in various parts of the world.

E. D. W. Greig.

ZIEMANN (Hans) [a.o. Professor an der Universität Berlin. Früher Med. Referent in Kamerun.] Gesundheits-Ratgeber für wärmere Zonen. [**Guide to Health in Hot Climates.**] 6th Edition, Revised and Enlarged.—90 pp. With 19 figs. & 7 charts. 1928. Berlin: Dietrich Reimer (Ernst Vohsen). [3 Rm.].

This is a small book of information and advice for those who dwell and work in the tropics. It has been written for the use of missionaries, planters and travellers who may find themselves in out of the way places. As stated by the author in his Preface, it is not intended to take the place of skilled medical attendance, but to guide and aid in illness when skilled help is not available. It deals also with the prevention of disease and the care of the body in tropical regions. Housing, diet, clothing, the value of pure water, etc., receive careful notice. Then follow special sections on tropical diseases; brief and condensed, but accurate so far as the plan of the book goes. The author has put as much information as possible into 90 pages. The book also contains a few useful illustrations, especially in connection with malaria where the eggs, larva and imago of Culex and Anopheles are depicted and the reader is warned against mosquitoes with spotted wings. Each short section contains paragraphs on symptoms, causes and treatment. At the end of the book are found surgical and medical outfits for travellers and small families. This "Guide" has now reached the sixth edition and is to be translated into English and Italian, facts which bear witness to its usefulness.

J. H. Tull Walsh.

RIVERS (Thomas M.) [Edited by.] **Filterable Viruses.** By Harold L. AMOSS, Jacques J. BRONFENBRENNER, Alexis CARREL, Edmund V. COWDRY, Rudolf W. GLASER, Ernest W. GOODPASTURE, Louis O. KUNKEL, Stuart MUDD, Peter K. OLITSKY, Thomas M. RIVERS. —pp. ix+428. With 26 figs. & 15 plates (1 coloured). 1928. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, W.C. 2. [34s.]

This volume is a symposium, and has the virtues and limitations of its type. As the editor expressly states, no attempt has been made to produce an encyclopaedia; and the student who requires a Baedeker to the filtrable viruses will find inconvenient gaps. But, if he reads the ten chapters, noting the divergencies of opinion and the different methods of approach, and trying to differentiate between what is certainly known and what is surmised with a greater or less degree of probability, he will gain an insight into the present position of the whole problem, which will well repay his trouble.

The introductory chapter, by the editor, is a reprint, in a slightly altered form, of a paper which has already been published elsewhere, and was reviewed in an earlier number of the *Bulletin of Hygiene* (1928. Vol. 3. p, 481)

The second chapter, by Dr. Mudd, on fiters and filtration, deals with certain of the factors which may influence the passage of small particles through filter-candles or through collodion membranes. It forms a valuable introduction to the chapters which follow, and renders less surprising the conflicting evidence on matters of fact, with which every student of the literature must be familiar. The concluding paragraph of this chapter may be commended to all workers in this field :

" In the studies on the filterability of active agents there should be recorded, in addition to full biological details, any preliminary manipulation of the filter or of the material to be filtered ; the type and size of filter used ; whether filter is new or old, and, if used, for what purpose ; air-pressure test of filter ; content and dilution of fluid to be filtered, including active agent, control organisms, colloids, electrolytes, and approximate reaction ; filtration pressure ; volume of filtrate ; the stage in the filtration process at which specimens are collected for tests ; media and animals into which specimens of the filtrate are inoculated."

The third chapter, by Dr. Carrel, deals with tissue cultures in the study of viruses.

In the fourth chapter Dr. Cowdry discusses the problem of intercellular pathology in virus diseases and favours the view that the various inclusion bodies, which have been described, are cellular products rather than modified forms of the filtrable virus itself.

There follow five chapters on the virus diseases affecting particular host-species, illustrated in each case by a particular example : in man by poliomyelitis, described by Dr. Amoss : in mammals by foot-and-mouth disease and vesicular stomatitis, described by Dr. Olitsky : in birds by fowl-pox, described by Dr. Goodpasture : in insects by sacbrood of honey-bees and polyhedral diseases, described by Dr. Glaser : and in plants by the various mosaic diseases, described by Dr. Kunkel.

Finally Dr. Bronfenbrenner contributes a stimulating and informative chapter on the bacteriophage, which, as he rightly claims, cannot be excluded from a general survey of the filtrable viruses, whatever view may be taken as to its actual nature.

Each of the contributors has first-hand experience of the subject with which he deals, and each has himself added to our stock of knowledge.

The chapters on the virus diseases of insects and of plants will be particularly valuable to medical bacteriologists, whose experience lies mainly with man and with domesticated animals. The rôle played by insects in the spread of mosaic disease, and the striking specificity of some of these vectors, is a beautiful example of the dependence of natural infection on the principles of ecology ; and the absence of acquired resistance in plants offers a provocative problem to the immunologist.

The bibliography attached to each chapter will point the way for any reader who desires to extend his enquiries in any particular direction.

[Abridged from review by Prof. W. W. C. Topley in *Bulletin of Hygiene*, 1928. Oct. Vol. 3. p. 906.]